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St. Louis Metro Area 08250660 Rail Gateway Enterprise

DRAFT ENVIRONMENTAL IMPACT STATEMENT Technical Supplement GRADE SEPARATION ANALYSIS

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TECHNICAL SUPPLEMENT

GRADE SEPARATION
ANALYSIS

Prepared for:

Federal Railroad Administration
Illinois Department of Transportation
St. Louis MARGE
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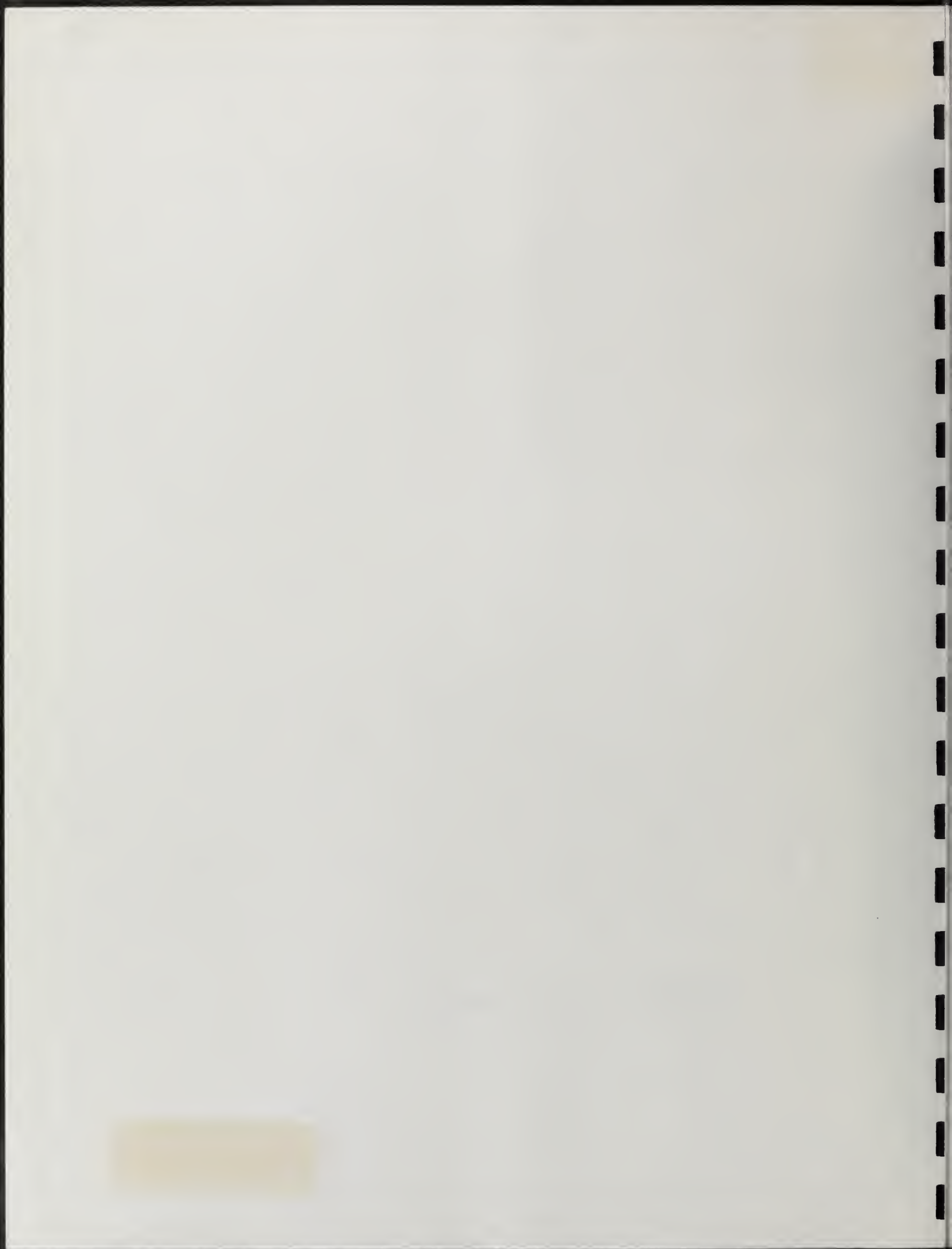
Prepared by:

Sverdrup-Envirodyne-Knight
St. Louis, Missouri

June, 1981

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EXECUTIVE SUMMARY

The purpose of this study was to determine which rail/highway crossings within the project area of the St. Louis Metro Area Rail Gateway Enterprise warranted grade-separation. The study analyzed the effects that the four major project alternatives would have on each of the 240 at-grade rail/highway crossings in the Year 2000. This report is a Technical Supplement to the Draft Environmental Impact Statement for the project, and will be summarized in the text of that document.

The following factors were taken into consideration for each crossing to determine grade separation warrants:

- Daily number of trains
- Daily number of vehicles (average daily traffic, or ADT)
- Existing type of crossing protection (passive, flashers, flashers and gates)
- Functional classification of the highway (arterial, collector, local)
- Crossing location (urban or rural geographical area)

The results of the studies performed indicate that seventeen crossings warrant grade-separation in the project area under the Directional project "build" alternatives, eighteen under the Bidirectional alternatives, and that nine crossings would warrant separation even under the "no-build" alternative.

The study does not examine funding sources for these separations, which have a total estimated construction cost ranging from \$28.2 million under the No-Build Alternative to \$54.8 million under the Three-Yard Bidirectional Alternative (with the remaining two build alternatives at \$52.1 million). Seven of the 17-18 crossings warranting separation under the build alternatives would be warranted due to yard expansions that are part of the overall project. It appears that those structures, at least, would be the responsibility of the railroads undergoing expansion of their facilities. The remaining 10-11 crossings represent conflicts along the major rail corridors in the study area. It would appear that the normal funding source for grade separations, i.e. the Grade Crossing Protection Fund in Illinois, which is under the authority of the Illinois Commerce Commission, should bear much of the responsibility for construction of these structures. This fund faces enormous demands already, and it should be understood that no attempt has been made in this Report to address the question of how warranted crossings in the project area compare to other needs Statewide.

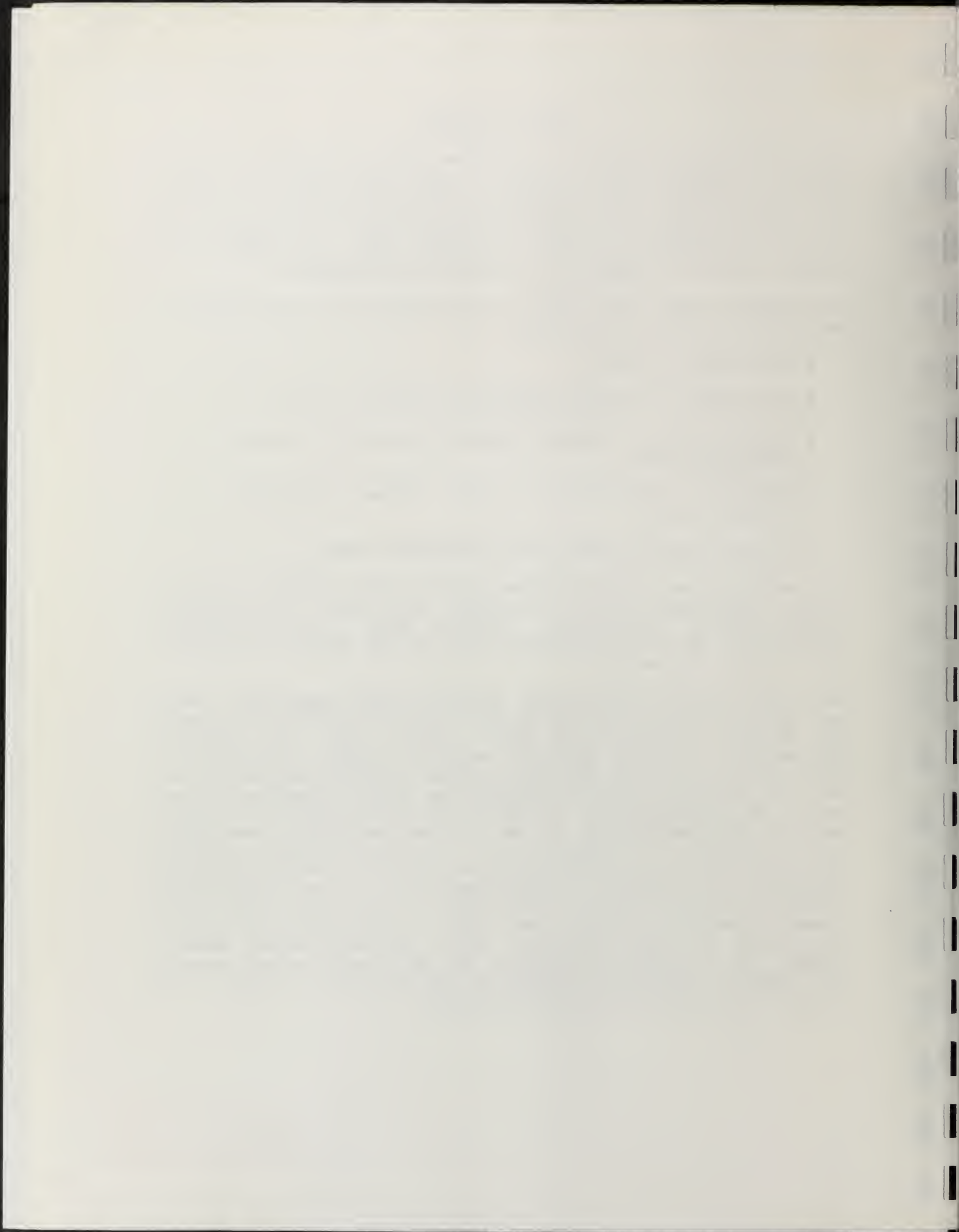


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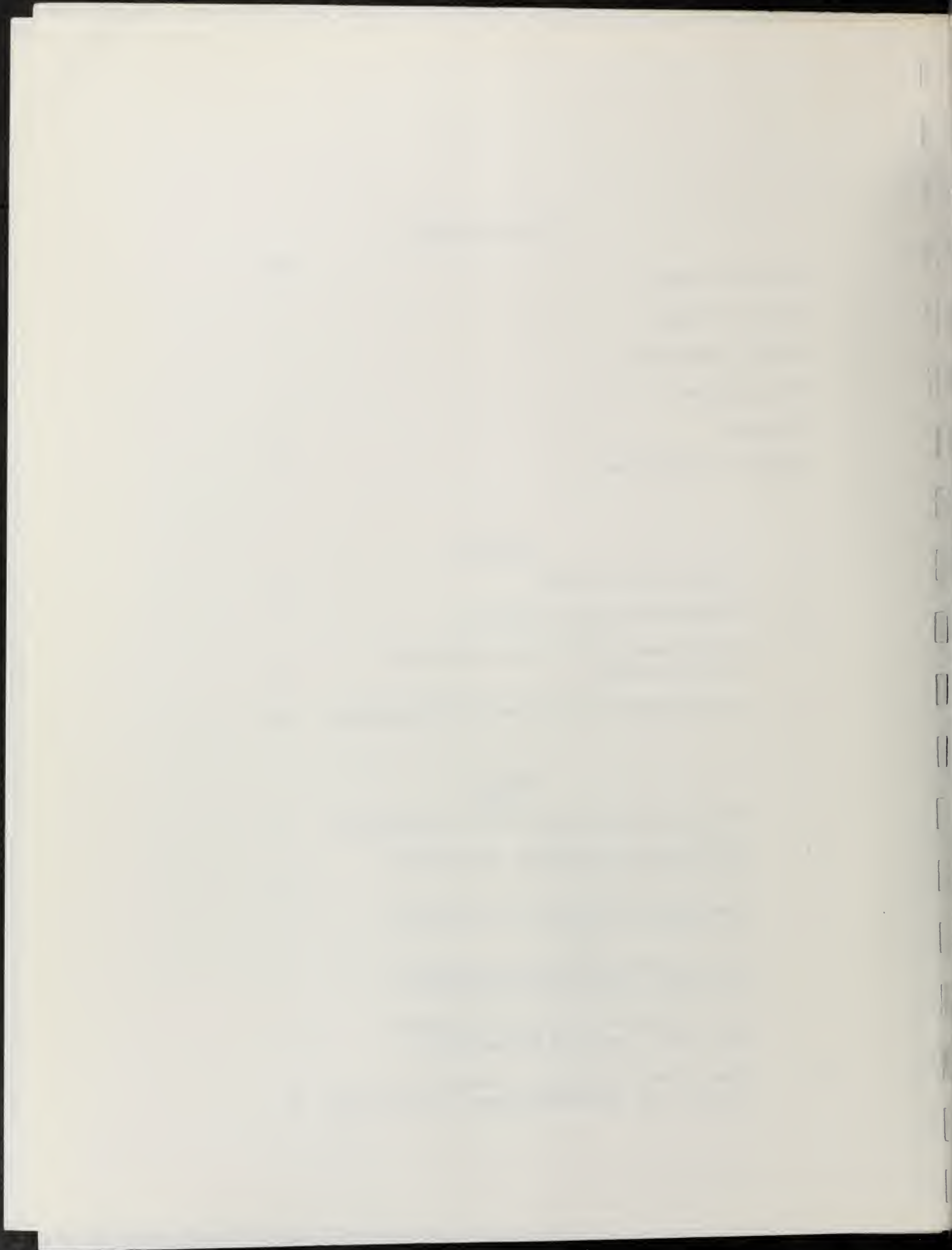
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PROJECT DESCRIPTION

Background:

The St. Louis railroad complex, alternately called a "gateway" or a "terminal", is of major importance to the national railroad network, and its vitality is critical to the industrial and economic health of the region. Geographically, it lies near the nation's center. Situated on the banks of the Mississippi, the Gateway takes in portions of the States of Missouri and Illinois. On the west side, the majority of the rail facilities lie near the river. On the east side, however, the network extends eastward some five miles to include the Alton & Southern (A&S) Corridor east of Washington Park. The major Illinois communities within the project area are East St. Louis, Granite City, Madison, Venice, Brooklyn, Cahokia, Centreville, Alorton, Dupo, Washington Park and Fairmont City. The southern boundary is the Bixby Rail Junction south of Dupo, and the northern boundary is Lennox Rail Tower in Mitchell. Exhibit A shows the St. Louis Gateway area.

The St. Louis Gateway is the second largest rail traffic routing center in the nation. The network includes track or facilities belonging to 14 major (Class I) railroad companies, and 3 Class II (switching) carriers. There are approximately 82 miles of mainline corridors in the gateway area. The sorting of cars into trains destined for other parts of the country is mainly accomplished in two large common classification yards, Madison Yard on the north and Gateway Yard on the south. Other classifications are performed in a series of "home" yards where individual railroads handle freight and trailer traffic. Gateway Yard is operated by the Alton and Southern Railroad, while the Terminal Railroad Association (TRRA), a corporation composed of eleven railroads operating in the complex, manages the functions of Madison Yard. Individual roads are charged by either of these switching carriers for the rail cars which go through the classification process in their facilities.

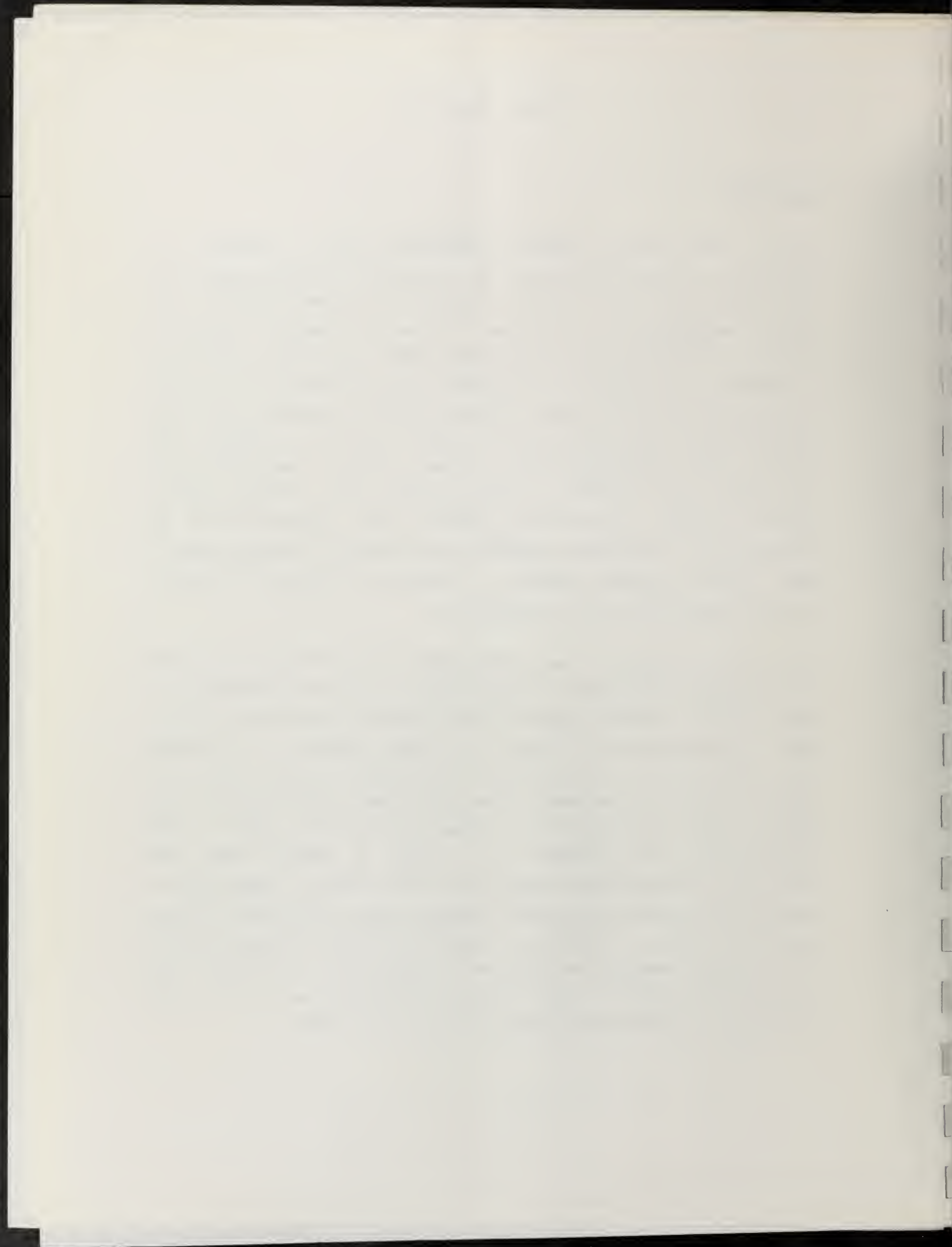


EXHIBIT A

STUDY AREA



VICINITY MAP

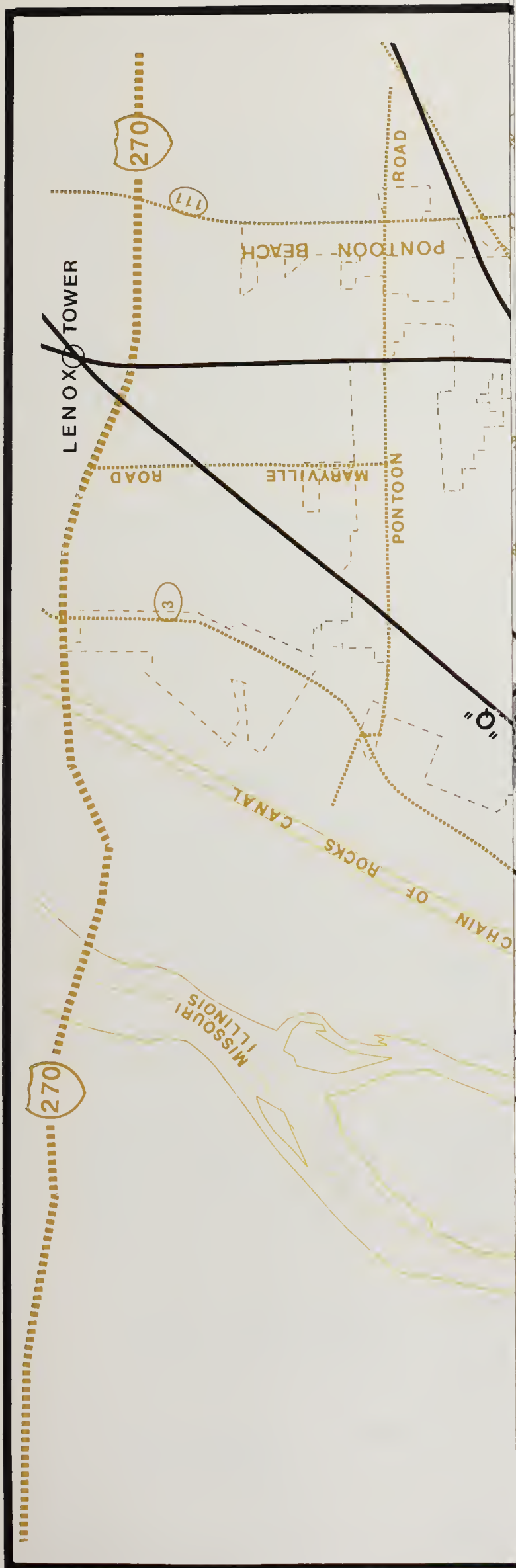
LEGEND

- ROUTE 3 RELOCATION AREA
- RAILROADS
- INTERSTATES
- PROPOSED RAILROAD YARD
- CITY STREETS
- EXISTING RAILROAD YARD

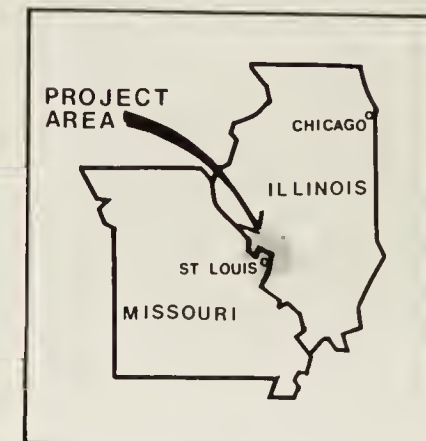
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SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT



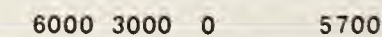
STUDY AREA



VICINITY MAP

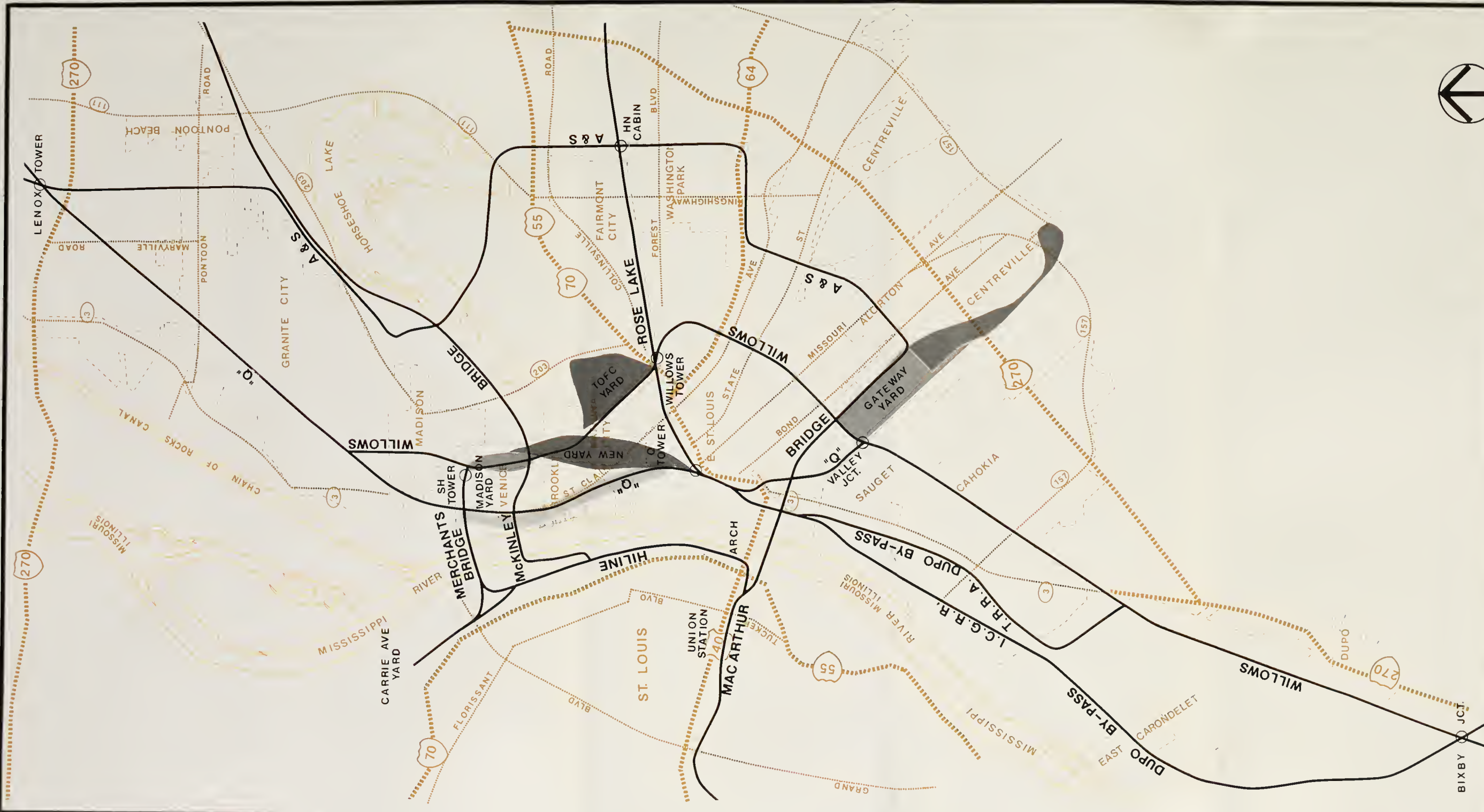
LEGEND

ROUTE 3 RELOCATION
AREA
RAILROADS
INTERSTATES
PROPOSED RAILROAD
YARD
CITY STREETS
EXISTING RAILROAD
YARD



SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT



Railroad freight terminals, such as the one in St. Louis, are typically bottlenecks in the operation of rail systems. Increased rail traffic and age have reduced the efficiency of terminal operations and shipments often encounter excessive delays moving through congested switching and classification facilities. Facilities built early in the development of the rail system have become obsolete, but have continued to occupy sizeable amounts of land, constraining land use patterns and forming barriers to social and commercial activity.

In the St. Louis Gateway the situation is worsened by the continued presence of yards and tracks originally built near the river to hold cars awaiting the ferry crossing. These facilities became unnecessary as bridges were built and were used less and less until, in some cases, they were virtually abandoned. As in other urban rail terminals, this has served as a blighting influence on the area's economic development. Further, underutilized railroad properties do not yield tax revenues proportional to the amount of land they cover. The complicated network of yards and track has also produced a contorted street system where delays to vehicular traffic are frequent and lengthy. This combination of problems attributable to railroad influences has lead the Federal Railroad Administration (FRA), in concert with state and local officials, to seek ways to improve rail operations and to create valuable urban development opportunities by freeing riverfront land.

St. Louis Metro Area Rail Gateway Enterprise

The efforts of the FRA toward resolving the problems of the St. Louis Gateway through railroad improvements were focused into a three phase program entitled the Metro Area Rail Gateway Enterprise or MARGE. The program focused on accomplishing the following three objectives:

- To improve the efficiency of railroad operations within the St. Louis Terminal
- To reduce rail/community conflicts
- To provide opportunities for economic and community development.

Phase I, which was successfully completed in December, 1977, was limited to the development and preliminary examination of operationally feasible physical restructuring alternatives. This initial study was jointly directed by the Federal Railroad Administration and all the 17 railroads operating in the Terminal.

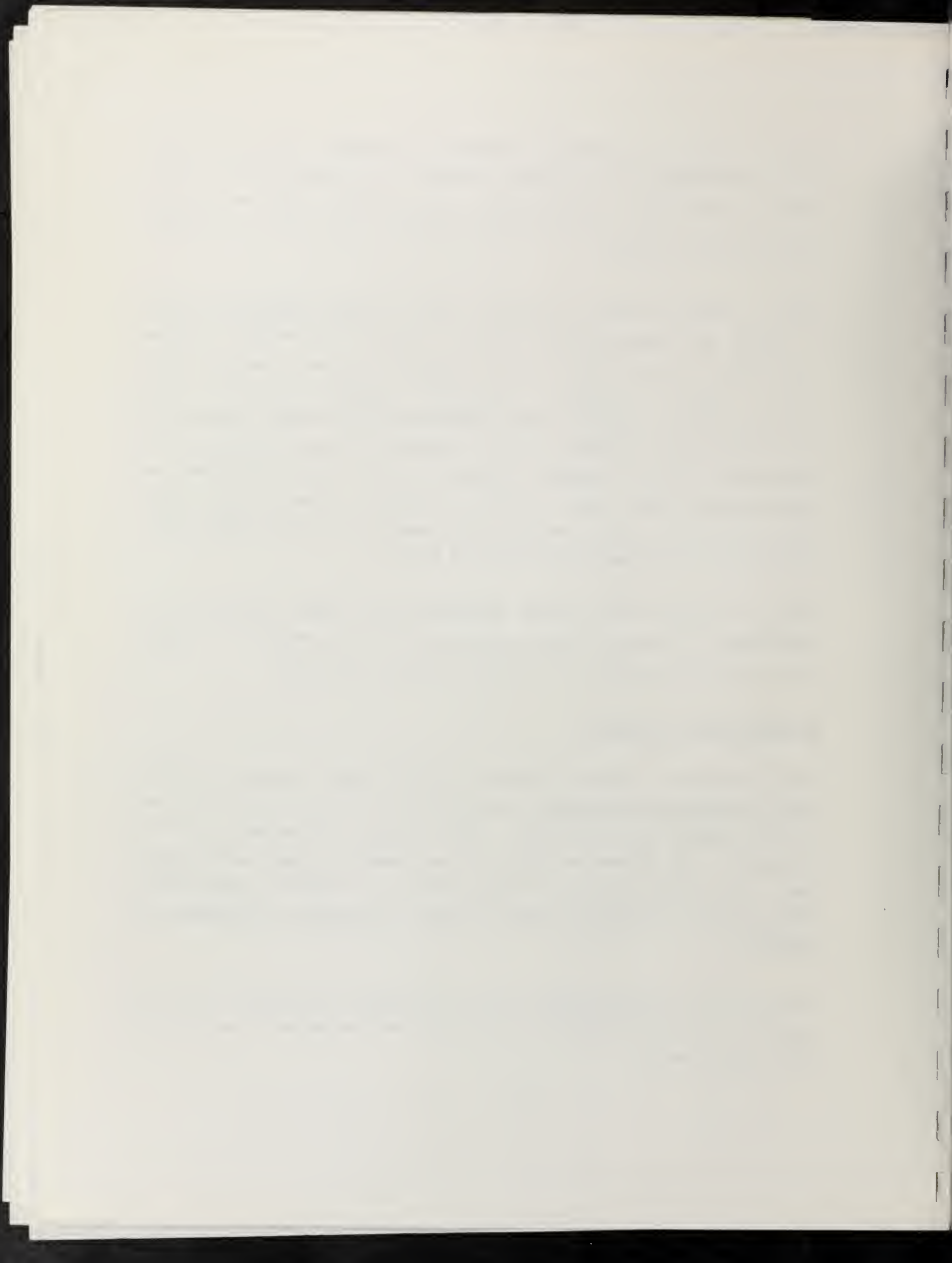
Phase II, which was begun in January, 1979, is a more comprehensive study to refine the restructuring plans and resolve the various railroad institutional issues as well as the community and environmental impact issues. Phase II includes a cost/benefit analysis for each of the railroads involved, together with a comprehensive cost/benefit analysis of the railroad restructuring, and will culminate in the publication of an Environmental Impact Statement. Managed by the Illinois Department of Transportation (IDOT), under contract to the FRA, Phase II has sought active involvement by the various local communities in the Gateway area, and continued the strong railroad role of Phase I.

Phase III involves final design engineering and actual construction of improvements to the rail yards and corridors in the terminal. It begins after an alternative plan for the restructuring is selected.

Restructuring Alternatives

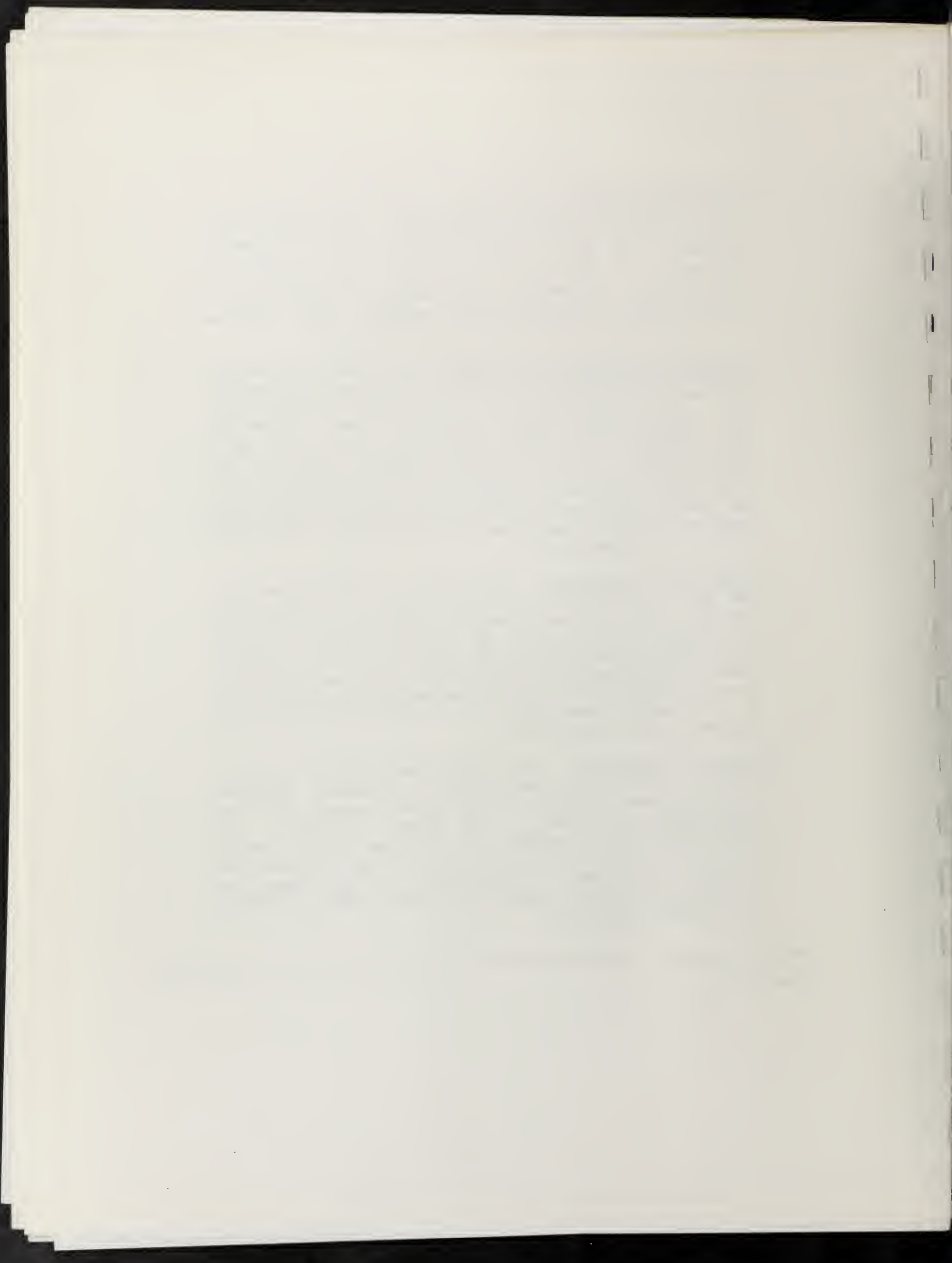
There are currently some 63 railyards in the St. Louis Gateway. The MARGE project proposes consolidation of many of the smaller rail yards into two or three larger yard facilities. Three "build" alternatives are fully evaluated. Each alternative differs by the number of common carrier yards and by the routing of the corridor traffic. In addition, the existing 1979 conditions and the year 2000 "No Build" alternative are analyzed and compared.

The actual yard restructuring alternatives exhibit differences in both the number of yards which would be constructed and the manner in which those yards would operate:



- Two-Yard Alternative - This plan calls for the expansion of the two existing classification yards. The Gateway Yard, located south of East St. Louis, would be expanded eastward. This area is partly within the boundaries of Centreville, Illinois and is currently agricultural and residential. The Madison Yard, which is just east of Venice, would be modified and expanded south past the residential areas of Brooklyn and National City.
- Three-Yard Directional Alternative - This plan involves the expansion of Gateway Yard, minor improvements to Madison Yard and the construction of a third yard, the "New Yard". This third yard would be located just south of Madison Yard, adjacent to the town of Brooklyn. Madison Yard would then function as an industrial support yard with the classification functions transferred to New Yard. The Directional distinction refers to the operational plan for the yards, which would have one yard handle trains coming from the East and headed West, and the other coming from the West and headed East.
- Three-Yard Bidirectional - This plan is distinguished from the above only in the operational plan of car and train routing. Each yard would route traffic in all directions. The physical configurations of the yards would be similar to the Directional Plan, except that the New Yard would be located approximately 200 feet further from the residential areas of Brooklyn, and that the expanded Gateway Yard would be constructed about 200 feet farther south from the housing areas of Centreville.
- No-Build Alternative - As a bench mark against which to analyze the "build" alternatives, a "no-build" situation has also been studied. This plan assumes that no improvements are made to the Gateway terminal. The No-Build Alternative assumes that the same traffic levels will exist in St. Louis in the Year 2000 as are projected for the Build cases. This traffic, to the extent it overtaxes the common classification yards, would be handled at individual rail yards.

Several elements of the consolidation are the same across all the "build" alternatives:



- A segment of Illinois Route 3 would be relocated in order to bypass the expanded yards. The designated section begins just north of Merchants Bridge in Madison County as four-lane highway and continues 3 miles south as a two-lane road through Venice and Brooklyn, past National City, ending at St. Clair Avenue in East St. Louis. The relocation would provide a two- or four-lane, limited-access highway for this distance.
- A common trailer-on-flatcar (TOFC) yard would be constructed east of Brooklyn and north of East St. Louis. The location is convenient to a major interchange connecting Illinois Route 203 and Interstate 70, providing excellent access for trucks. A major rail corridor runs just west of the site. Eight or nine of the thirteen Class I carriers would consolidate their TOFC, or piggyback operations into that one yard.
- There are approximately 82 miles of main line rail corridor in the project area, and much of this would be upgraded under all of the build alternatives. Track would be physically improved by laying new or replacement track and modern centralized signaling systems would be installed. Several new rail connections or interlockings would be constructed, but the locations of the corridors and existing interlockings would remain the same. Rail operations and train routings may vary across alternatives, but the basic corridor network does not.
- Seventeen-eighteen grade-separation structures are warranted under all the build alternatives, due to the large delay- and collision-related conflicts which occur in the project area. Seven of these would be warranted because of yard expansions; the remainder are warranted due to conflicts along the rail corridors. Nine of these structures would also be warranted under the No-Build Alternative.

STUDY APPROACH

This study began with the preparation of an inventory of all at-grade rail/highway crossings within the study area. To collect data for this inventory, an Illinois Department of Transportation (IDOT) computer listing of crossing information, which provided detailed information for each location, was utilized. From this printout, it was determined that there are approximately 240 at-grade rail/highway crossings within the project area. These crossings were then screened to determine which could be eliminated from further study, using the following criteria:

- Crossings with less than 500 ADT
- Crossings with more than 500 ADT, but less than two trains per day
- Discussions with the community engineer or other responsible official.

This elimination process reduced the base to 75 crossings which required additional investigation. To determine whether improvements in the level of protection afforded to these crossings were warranted, the prescribed IDOT procedures were utilized. This information is contained in the "Design Manual," Section 3, Subject 3-500 Railroad/Highway Improvements, which is published by the Bureau of Design, Department of Transportation, State of Illinois. These procedures are based on those of the Federal Highway Administration.

Of the 75 crossings that were selected for further investigation, it was determined that several crossings could be consolidated and treated as multiple track locations. This process established 53 locations within the project area that would be studied for each restructuring alternative, including the No-Build Alternative. These crossings are listed in Appendix I, and their locations are depicted on Figures A through I.

DISCUSSION

The crossings studied included seven locations where rail yard expansion is proposed as part of the overall project. Each of these locations may require separation in order to prevent severe displacement (through landlocking) or other impacts, these structures are listed on Table I. Detailed studies of each of these seven locations will be performed during the design engineering phase of the project, to determine if grade separations or some other, less costly means of handling traffic (such as service or new connecting roads) would be the best solution to each problem. In addition, five grade-separation structures in the project area are already under construction, or have been proposed for funding, by an East St. Louis/Federal Highway Administration rail-crossing conflict elimination demonstration project. These are noted on Attachment I (in Appendix I), and were eliminated from further consideration in this study. After setting these two types of locations aside, the remaining locations of major rail/highway conflicts were analyzed, using the warranting requirements presented in the IDOT Design Manual referenced above.

The first warranting requirement is the determination of the Expected Accident Frequency Ratio (EAF) which indicates the probability of an accident occurring at a specific crossing. If a crossing does not have an EAF of 0.02 or greater (i.e. a prediction of two or more accidents in a hundred years), it was eliminated from further consideration. The second warranting requirement is to determine the Accident Savings Benefit/Cost Ratio, which indicates the cost benefit based upon reduced accidents, for those crossings with an EAF of 0.02 or greater. The estimated average cost per accident is based on National Safety Council data, and updated annually. For 1980, the cost was estimated to be \$21,025. The Accident Benefit/Cost Ratio should equal 1.0 or greater.

Tables II, III, IV, and V show the results of the calculations that were made for each alternative. Having completed the calculations of the EAF and the Accident Benefit/Cost Ratio (column 8), it was determined that none of the selected crossings warranted a grade separation on the basis of accidents prevented.

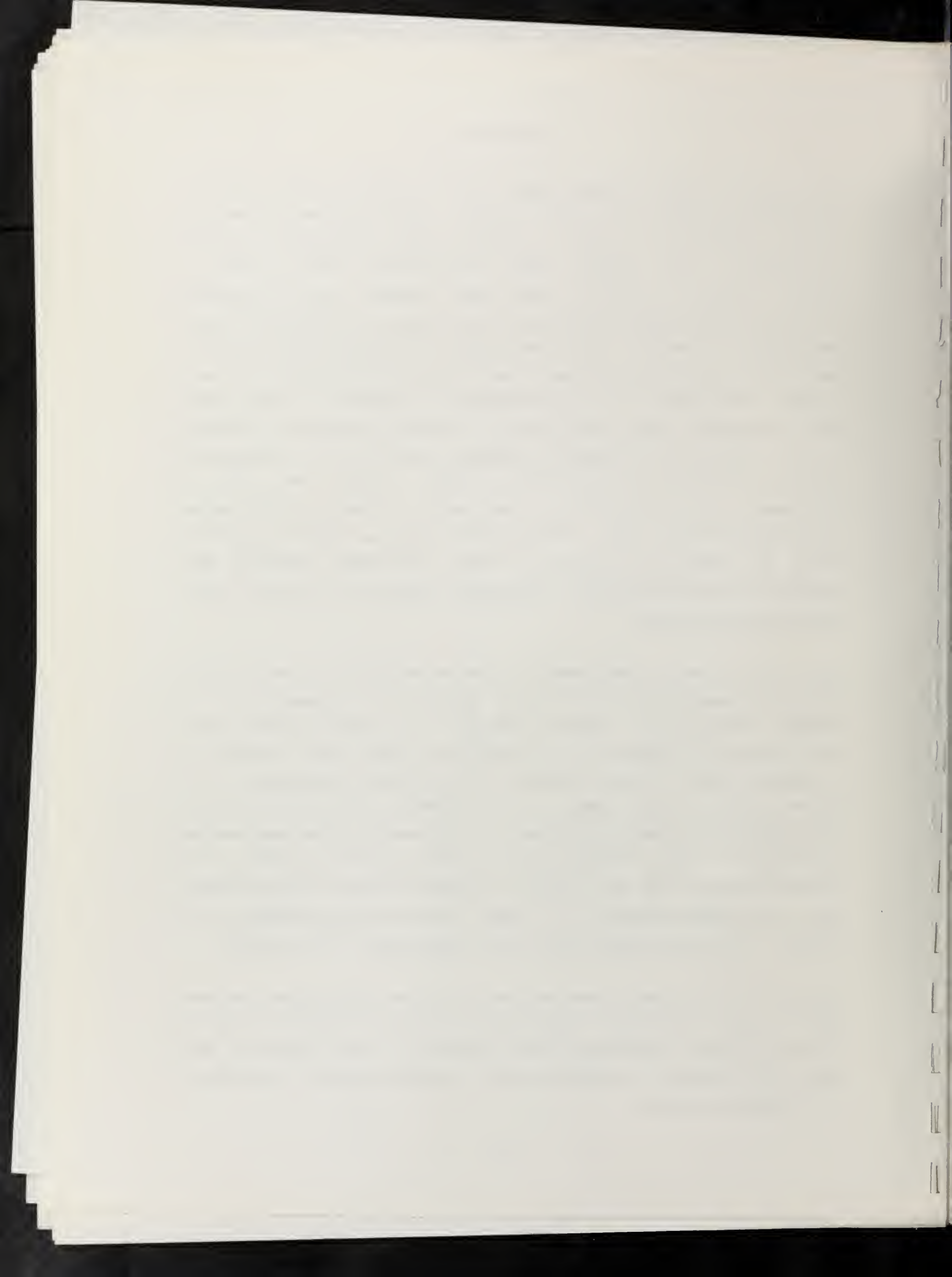


TABLE I
GRADE SEPARATIONS THAT MAY BE REQUIRED
DUE TO RAIL YARD EXPANSION

Structure Number	Street or Highway Name	City	Estimated Structure Cost (000,000)	Annual Structure Cost
10	Market	Venice	2.0	\$ 41,000
11 & 12	Bend	Brooklyn	5.5	114,000
48	Mousette	Centreville	8.0	164,000
49	Belleview	Centreville	3.4	70,000
50	SR 157	Centreville	3.3	67,000
53	Broadway	East St. Louis	1.3	27,000

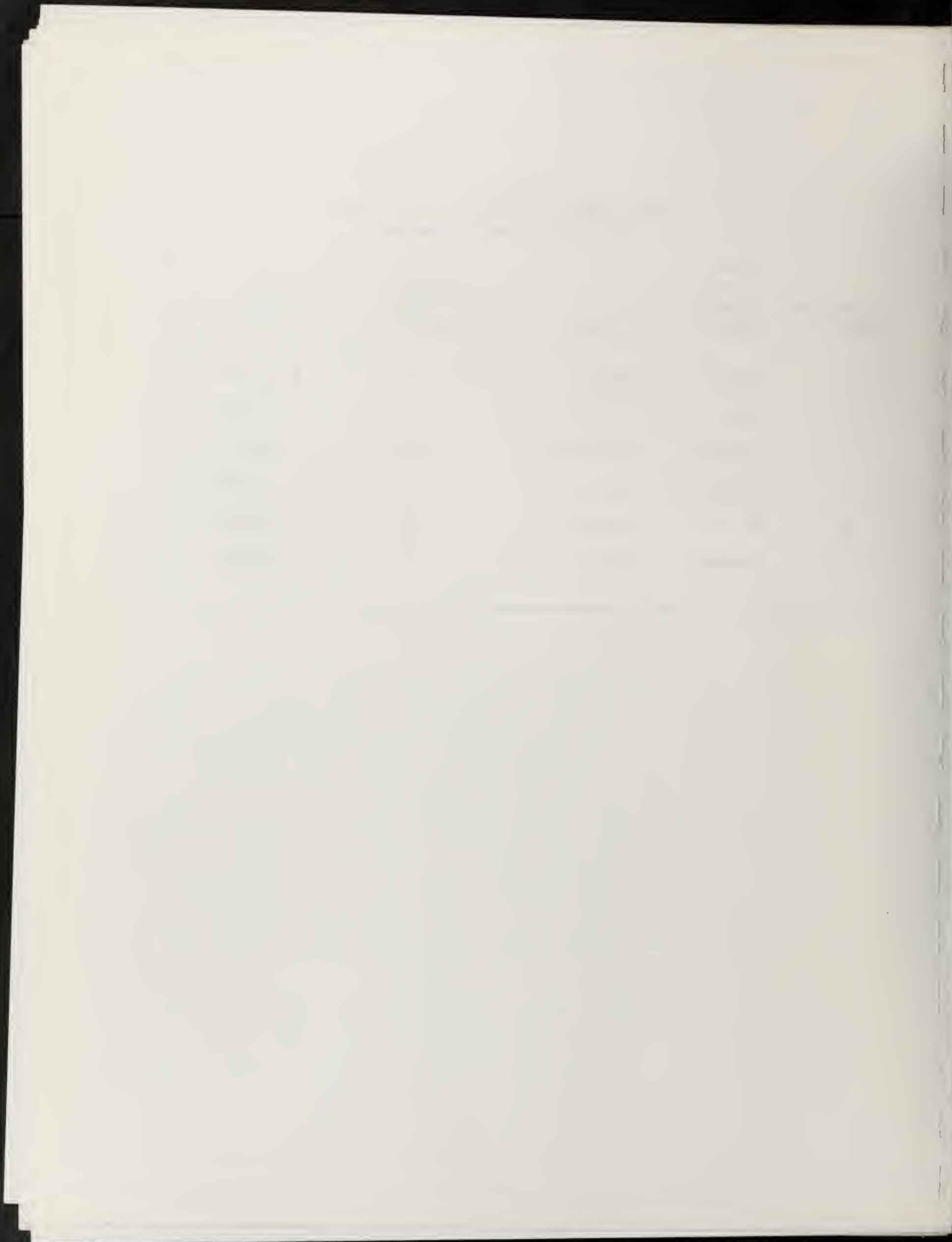


TABLE II
GRADE SEPARATION ANALYSIS
COST/BENEFIT
YEAR 2000 - NO BUILD

Appendix I

Appendix II

1 STRUCTURE NUMBER	2 NUMBER DAILY TRAINS	3 AVERAGE DAILY TRAFFIC (ADT)	4 EXPECTED ACCIDENT FREQUENCY (EAF)	5 ESTIMATED STRUCTURE COST (000,000)	6 ANNUAL STRUCTURE COST*	7 ANNUAL ACCIDENT SAVINGS BENEFIT	8 ACCIDENT SAVINGS BENEFIT/COST RATIO	9 DAILY BLOCKED CROSSING TIME (HOURS)	10 TOTAL DAILY DELAY (HOURS)	11 ANNUAL USER BENEFIT	12 USER BENEFIT/COST RATIO
1	52	6,700	.04	\$ 3.7	\$ 76,000	800	.01	4.3	50	\$ 78,000	1.03
2	8	10,000	.01								
3	52	10,800	.05	4.7	101,000	1,100	.11	4.3	81	126,000	1.25
4	16	12,800	.02	2.5	54,000	400	.01	1.3	30	46,000	.85
5	52	3,400	.02	1.9	39,000	400	.01	4.3	25	39,000	1.00
6	52	3,200	.02	8.0	171,000	400	.00	4.3	24	37,000	0.22
7	52	4,000	.04	9.6	205,000	800	.00	4.3	30	47,000	0.23
9	52	4,400	.02	8.0	101,000	400	.00	4.3	33	51,000	0.50
10	25	2,400	.00								
11	42	850	.00								
12	42	850	.00								
13	4	4,300	.00								
14	37	650	.00								
15	8	650	.00								
16	2	12,000	.00								
17	5	12,000	.01								
18	16	10,500	.04	1.5	30,000	800	.03	1.3	22	34,000	1.13
19	16	10,000	.02	2.7	58,000	400	.01	1.3	21	33,000	0.57
20	5	13,000	.00								
21	10	1,800	.00								
22	6	7,700	.00								
24	32	3,200	.01								
25	6	5,700	.00								
26	26	5,000	.01								
27	8	9,600	.01								
29	6	8,500	.01								
30	6	9,100	.01								
32	8	8,000	.01								
33	8	3,800	.00								
34	18	3,500	.00								
35	8	5,300	.01								
36	18	5,300	.01								
37	8	2,200	.00								
38	8	18,500	.01								
40	13	15,800	.04	3.5	75,000	400	.01	1.1	33	51,000	0.68
43	15	35,000	.03	8.0	101,000	600	.01	1.3	73	113,000	1.12
44	75	9,800	.08	1.6	32,000	1,700	.05	6.2	106	164,000	5.13
45	75	3,600	.03	1.6	32,000	600	.02	6.2	39	60,000	1.88
46	75	23,500	.17	3.5	75,000	3,600	.05	6.2	254	394,000	5.25
47	79	2,500	.04	1.7	34,000	800	.02	6.6	29	45,000	1.32
48	13	1,500	.00								
49	13	400	.00								
50	10	13,900	.01								
51	45	2,000	.01								
52	24	7,700	.02	2.0	43,000	400	.01	2.0	26	40,000	0.93
53	-	9,500	-								

* Includes annual maintenance cost

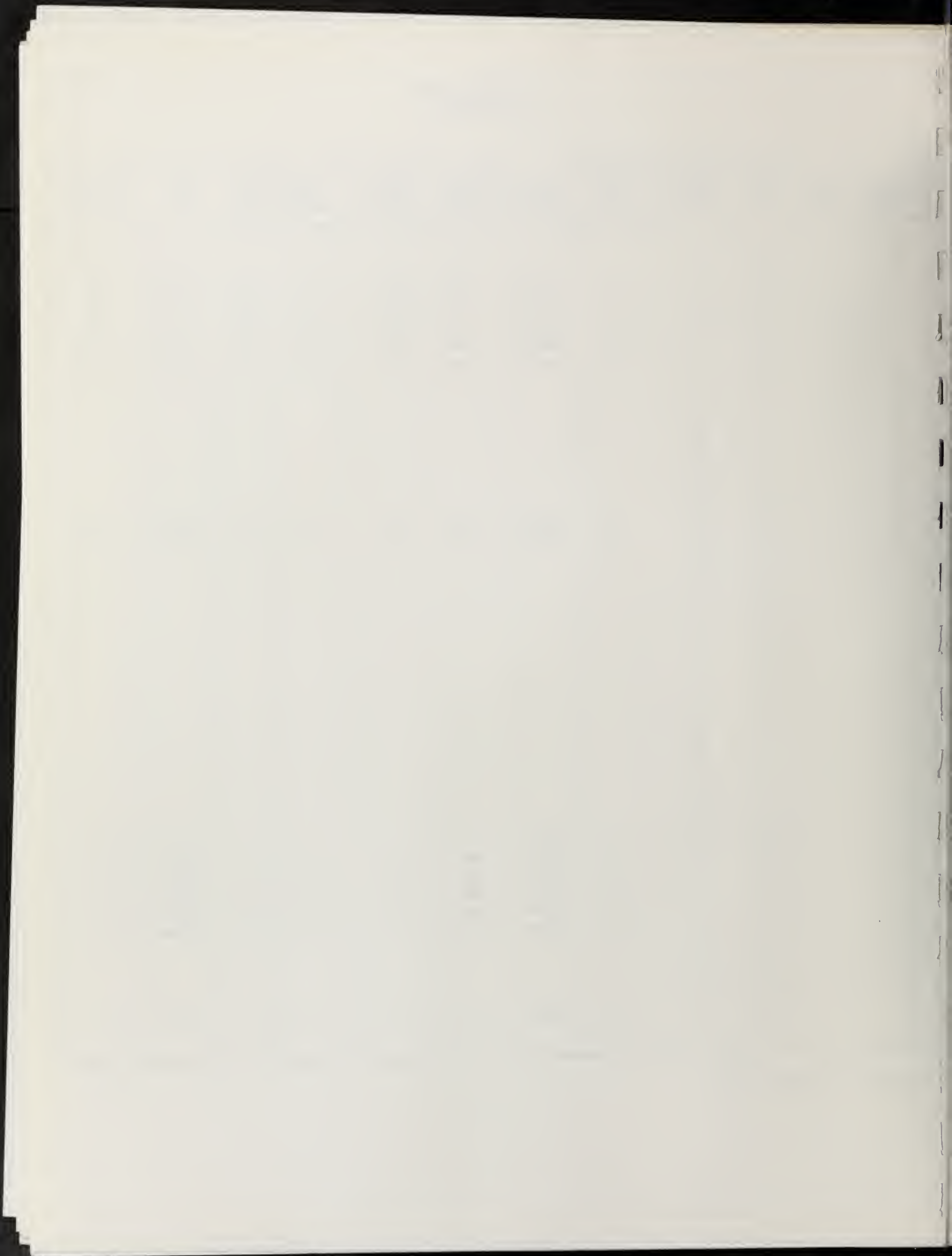


TABLE III
GRADE SEPARATION ANALYSIS
COST/BENEFIT
YEAR 2000 - TWO YARD

1 STRUCTURE NUMBER	2 NUMBER DAILY TRAINS	3 AVERAGE DAILY TRAFFIC (ADT)	4 EXPECTED ACCIDENT FREQUENCY (EAF)	5 ESTIMATED STRUCTURE COST (000,000)	6 ANNUAL STRUCTURE COST*	7 ANNUAL ACCIDENT SAVINGS BENEFIT	8 ACCIDENT SAVINGS BENEFIT/COST RATIO	9 DAILY BLOCKED CROSSING TIME(HOURS)	10 TOTAL DAILY DELAY (HOURS)	11 ANNUAL USER BENEFIT	12 USER BENEFIT/COST RATIO
1	48	6,700	.04	\$ 3.7	\$ 76,000	800	.01	4.0	47	\$ 73,000	0.96
2	9	10,000	.01								
3	48	10,800	.05	4.7	101,000	1,100	.01	4.0	76	118,000	1.17
4	27	12,800	.03	2.5	54,000	600	.01	2.3	50	78,000	1.44
5	48	3,400	.02	1.9	39,000	400	.01	4.0	24	37,000	0.95
6	48	3,200	.02	8.0	171,000	400	.00	4.0	23	36,000	0.21
7	48	4,000	.02	9.6	205,000	400	.00	4.0	28	43,000	0.21
9	48	4,400	.02	8.0	101,000	400	.00	4.0	31	48,000	0.48
10	YARD										
11	YARD										
12	YARD										
13	RELOCATE	13,300	-								
14	0	650	-								
15	0	650	-								
16	RELOCATE	12,000	-								
17	RELOCATE	12,000	-								
18	27	10,500	.07	1.5	30,000	1,500	.05	2.2	39	60,000	2.00
19	27	10,000	.03	2.7	58,000	600	.01	2.2	37	57,000	0.98
20	RELOCATE	13,000	-								
21	32	1,800	.01								
22	8	7,700	.01								
24	46	3,200	.02	1.5	30,000	400	.01	3.8	21	33,000	1.10
25	1	5,700	.00								
26	1	5,000	.00								
27	1	9,600	.00								
29	1	8,500	.00								
30	6	9,100	.01								
32	1	8,000	.00								
33	1	3,800	.00								
34	1	3,500	.00								
35	1	5,300	.00								
36	1	5,300	.00								
37	1	2,200	.00								
38	1	18,500	.00								
40	1	15,800	.00								
43	15	35,000	.03	8.0	101,000	600	.01	1.3	73	113,000	1.12
44	64	9,800	.06	1.6	32,000	1,300	.04	5.3	90	140,000	4.38
45	64	3,600	.03	1.6	32,000	600	.02	5.3	33	51,000	1.59
46	64	23,500	.15	3.5	75,000	3,200	.04	5.3	215	333,000	4.44
47	71	2,500	.04	1.7	34,000	800	.03	5.9	26	40,000	1.18
48	YARD										
49	YARD										
50	YARD										
51	56	2,000	.01								
52	28	7,700	.02	2.0	43,000	400	.01	2.3	32	50,000	1.16
53	YARD										

* Includes annual maintenance cost

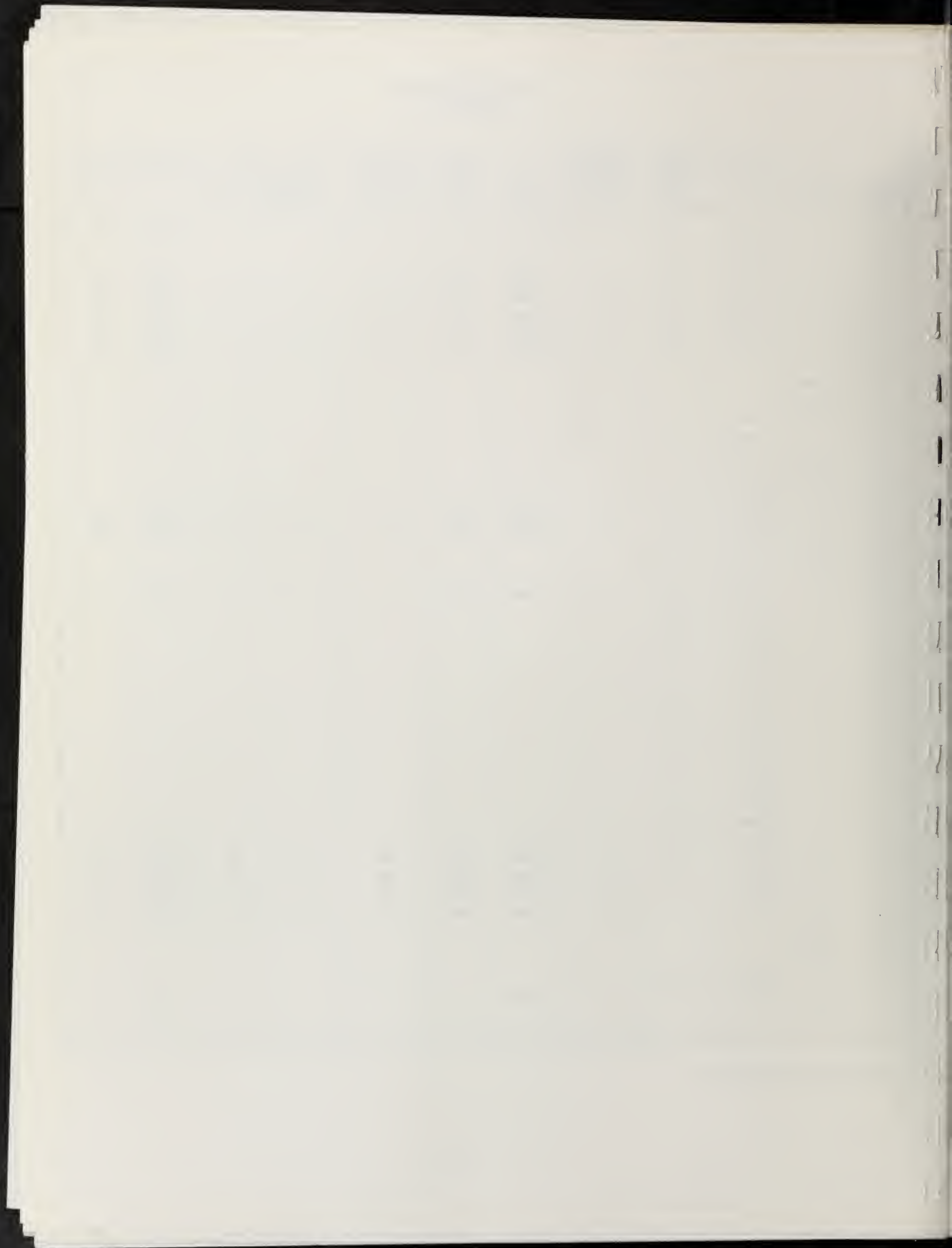


TABLE IV
GRAOE SEPARATION ANALYSIS
COST/BENEFIT
YEAR 2000 - THREE YARD
DIRECTIONAL

1 STRUCTURE NUMBER	2 NUMBER DAILY TRAINS	3 AVERAGE DAILY TRAFFIC (AOT)	4 EXPECTED ACCIOENT FREQUENCY (EAF)	5 ESTIMATED STRUCTURE COST (000,000)	6 ANNUAL STRUCTURE COST*	7 ANNUAL ACCIOENT SAVINGS BENEFIT	8 ACCIOENT SAVINGS BENEFIT/COST RATIO	9 DAILY BLOCKEO CROSSING TIME(HOURS)	10 TOTAL DAILY DELAY (HOURS)	11 ANNUAL USER BENEFIT	12 USER BENEFIT/COST RATIO
1	44	6,700	.03	\$ 3.7	\$ 76,000	600	.01	3.7	45	\$ 70,000	0.92
2	9	10,000	.01								
3	44	10,800	.05	4.7	101,000	1,100	.01	3.7	72	112,000	1.11
4	27	12,800	.03	2.5	54,000	600	.01	2.3	50	78,000	1.44
5	44	3,400	.01								
6	44	3,200	.01								
7	44	4,000	.02	9.6	205,000	400	.00	3.7	27	42,000	0.21
9	44	4,400	.02	8.0	101,000	400	.00	3.7	29	45,000	0.45
10	YARO										
11	YARO										
12	YARO										
13	RELOCATE	4,300	-								
14	0	650	-								
15	0	650	-								
16	RELOCATE	12,000	-								
17	RELOCATE	12,000	-								
18	27	10,500	.07	1.5	30,000	1,500	.05	2.2	39	60,000	2.00
19	27	10,000	.03	2.7	58,000	600	.01	2.2	37	57,000	0.98
20	RELOCATE	13,000	-								
21	33	1,800	.01								
22	1	7,700	.00								
24	47	3,200	.02	1.5	30,000	400	.01	3.9	21	33,000	1.10
25	1	5,700	.00								
26	1	5,000	.00								
27	1	9,600	.00								
29	1	8,500	.00								
30	6	9,100	.01								
32	1	8,000	.00								
33	1	3,800	.00								
34	1	3,500	.00								
35	1	5,300	.00								
36	1	5,300	.00								
37	1	2,200	.00								
38	1	18,500	.01								
40	1	15,800	.01								
43	15	35,000	.03	8.0	101,000	600	.01	1.3	73	113,000	1.12
44	59	9,800	.06	1.6	32,000	1,300	.04	4.9	82	127,000	3.97
45	59	3,600	.03	1.6	32,000	600	.02	4.8	30	47,000	1.46
46	59	23,500	.14	3.5	75,000	3,000	.04	4.9	196	304,000	4.05
47	60	2,500	.03	1.7	34,000	600	.02	5.0	22	34,000	1.00
48	YARD										
49	YARD										
50	YARD										
51	55	2,000	.01								
52	29	7,700	.02	2.0	43,000	400	.01	2.4	32	50,000	1.16
53	YARO										

* Includes annual maintenance cost

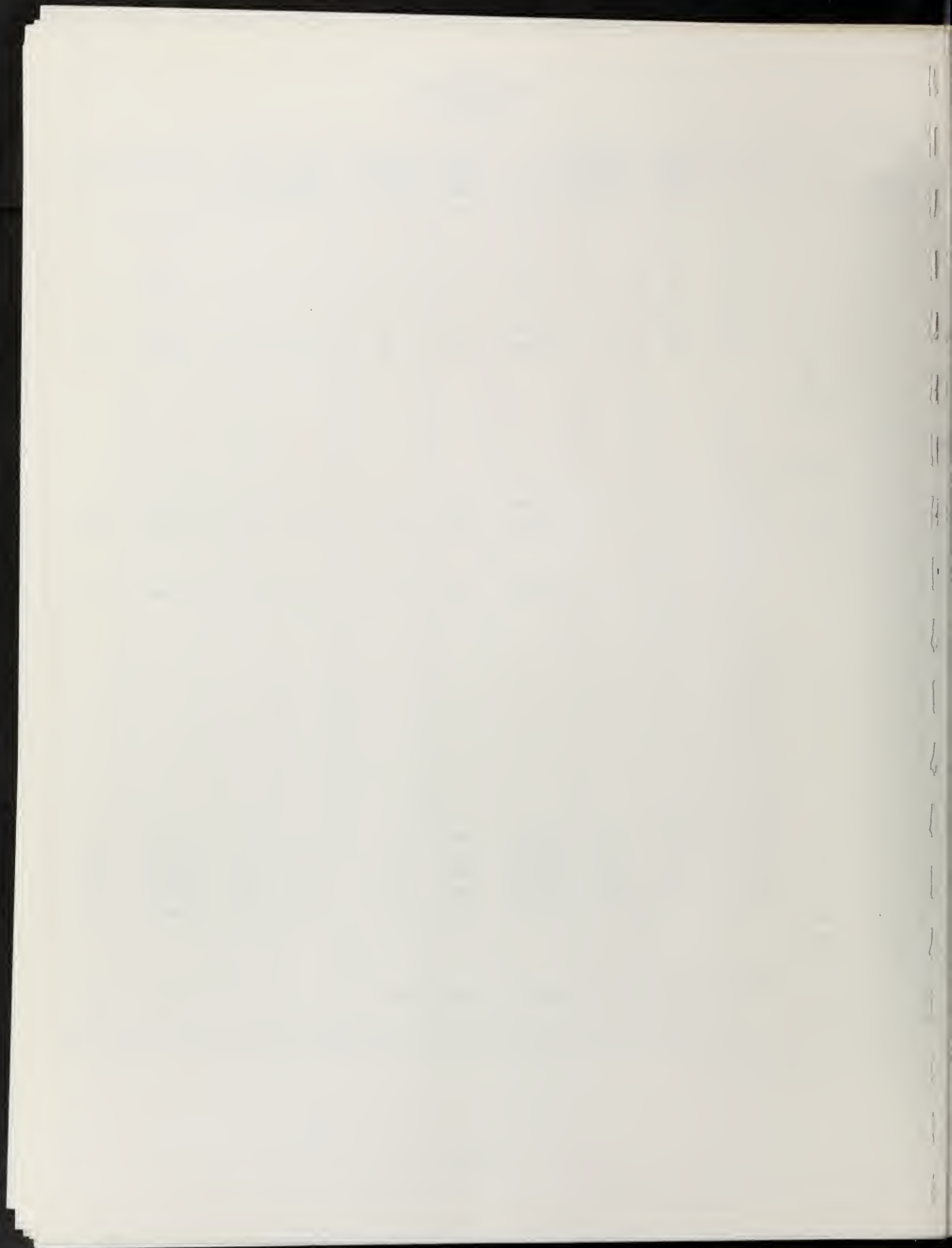


TABLE V
GRADE SEPARATION ANALYSIS
COST/BENEFIT
YEAR 2000 - THREE YARD BI-DIRECTIONAL

1 STRUCTURE NUMBER	2 NUMBER DAILY TRAINS	3 AVERAGE DAILY TRAFFIC (ADT)	4 EXPECTED ACCIDENT FREQUENCY (EAF)	5 ESTIMATED STRUCTURE COST (000,000)	6 ANNUAL STRUCTURE COST*	7 ANNUAL ACCIDENT SAVINGS BENEFIT	8 ACCIDENT SAVINGS BENEFIT/COST RATIO	9 DAILY BLOCKED CROSSING TIME	10 TOTAL DAILY DELAY (HOURS)	11 ANNUAL USER BENEFIT	12 USER BENEFIT/COST RATIO
1	45	6,700	.03	\$ 3.7	\$ 76,000	600	.01	3.8	47	\$ 74,000	0.97
2	10	10,000	.01								
3	45	10,800	.05	4.7	101,000	1,100	.01	3.8	72	113,000	1.12
4	31	12,800	.04	2.5	54,000	800	.01	2.6	57	90,000	1.66
5	45	3,400	.01								
6	45	3,200	.01								
7	45	4,000	.02	9.6	205,000	400	.00	3.8	27	42,000	0.21
9	45	4,400	.02	8.0	101,000	400	.00	3.8	29	45,000	0.45
10	YARD										
11	YARD										
12	YARD										
13	RELOCATE	4,300	-								
14	8	650	.00								
15	0	650	.00								
16	RELOCATE	12,000	-								
17	RELOCATE	12,000	-								
18	31	10,500	.08	1.5	30,000	1,700	.06	2.6	48	75,000	2.50
19	31	10,000	.03	2.7	58,000	600	.01	2.6	46	72,000	1.24
20	RELOCATE	13,000	-								
21	30	1,800	.00								
22	1	7,700	.00								
24	45	3,200	.01	1.5	30,000	200	.01	3.8	21	33,000	1.10
25	1	5,700	.00								
26	9	5,000	.00								
27	3	9,600	.00								
29	1	8,500	.00								
30	6	9,100	.01								
32	9	8,000	.01								
33	3	3,800	.00								
34	6	3,500	.00								
35	3	5,300	.00								
36	6	5,300	.00								
37	9	2,200	.00								
38	9	18,500	.01								
40	9	15,800	.01								
43	15	35,000	.04	8.0	101,000	800	.01	1.3	73	114,000	1.13
44	79	9,800	.08	1.6	32,000	1,700	.05	6.6	114	178,000	5.56
45	79	3,600	.03	1.6	32,000	600	.02	6.6	42	66,000	2.06
46	79	23,500	.18	3.5	75,000	3,800	.05	6.6	274	429,000	5.72
47	72	2,500	.04	1.7	34,000	800	.02	6.0	26	41,000	1.21
48	YARD										
49	YARD										
50	YARD										
51	55	2,000	.01								
52	37	7,700	.03	2.0	43,000	600	.01	3.1	42	66,000	1.54
53	YARD										

* Include annual maintenance cost

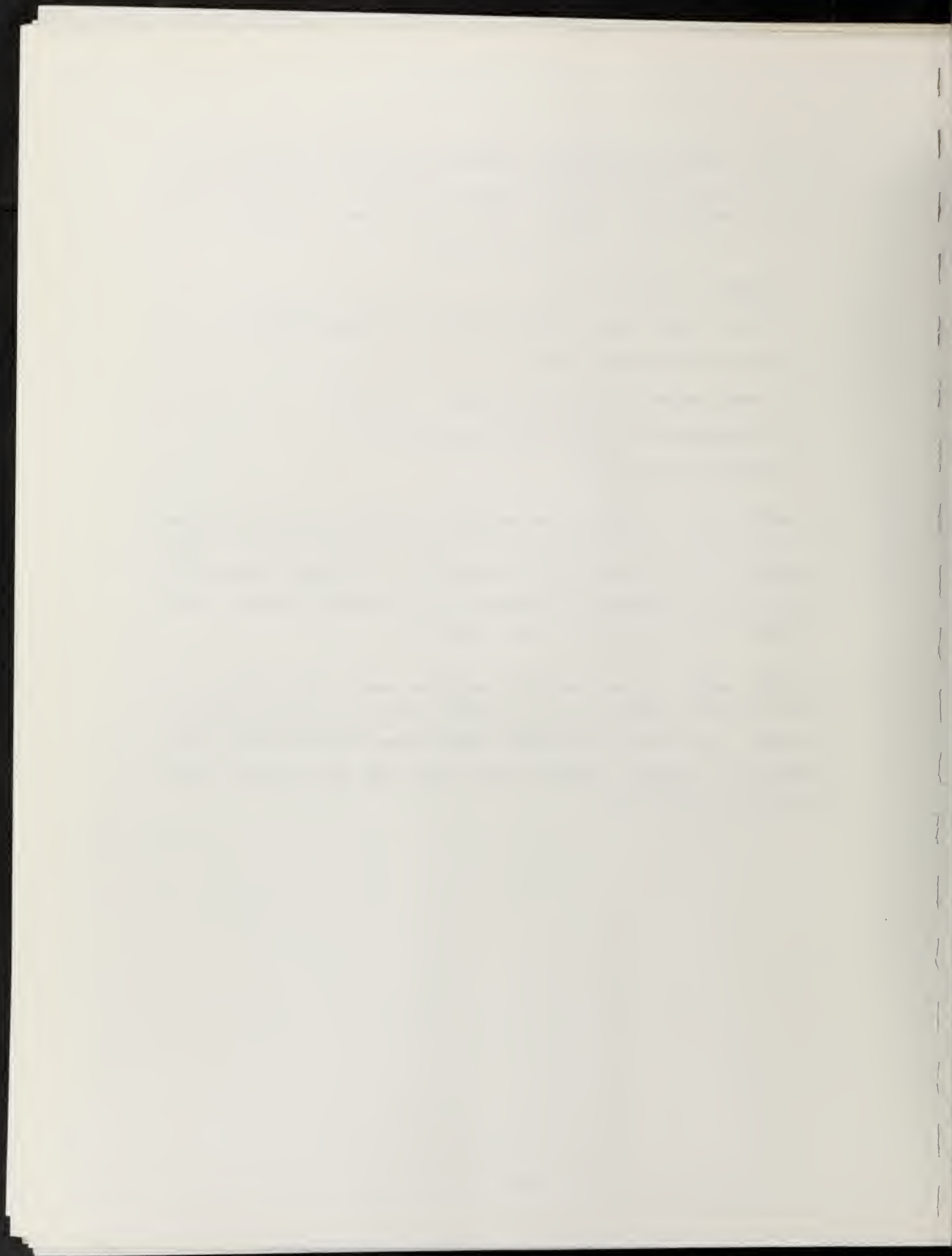


Therefore, additional warranting was performed on the crossings (still only those with an EAF of 0/02 or greater qualify) in the form of a User Savings Benefit/Cost Analysis. The calculation to determine user savings is based upon the following factors:

- Number of trains per day
- Average train length (time blocking the crossing) (5 min.)
- Average daily traffic (ADT)
- Average number of work days per year (313 days)
- Perceived hourly value of time (\$5 per hour)
- Annual structure cost

By taking into consideration the variable information for each crossing, as shown above, and dividing by the annual structure cost, a grade separation is justified on User Savings if the resultant Benefit/Cost ratio is 1.0 or greater. The results of this analysis are also listed in Tables II, III, IV, and V, under column 12.

Crossings which did not warrant separation were also examined with respect to the adequacy of the current level of crossing protection provided. In all cases, preliminary examinations indicated that traffic volumes and accident experience were such that the existing safety measures were sufficient.



SUMMARY AND CONCLUSIONS

Those crossings with an EAF of .02 or greater and a User Savings Benefit/Cost Ratio of 1.0 or greater are summarized in Table II. Each alternative and rail/highway crossing have unique characteristics that determined which sites warranted a grade separation. While these crossings meet the mathematical criteria which were used, further analysis is required before a firm decision to construct could be made. For example, some crossings may simply be impossible to build, or may have such large displacement impacts that they are infeasible. It must also be noted that the warranting formulas selected specific crossings and did not take into consideration traffic patterns. Some of the recommended crossings are located very closely together. Obviously, construction of one separation may alter nearby traffic patterns, thus changing the need for additional crossings in that same area. This factor would require further study and input from the local residents prior to construction decisions.

The locations shown in Table VI are listed in order of recommended installation, which was determined by the numerical value of the ratios plus a more subjective (i.e. through engineering judgement) evaluation of need. Locations where grade separations are warranted are shown on Exhibit B for the No-Build Alternative and on Exhibits C and D for the various build alternatives.

In summary, a large number of rail/highway crossings have been analyzed to assess their potential for grade separation to reduce rail/highway conflicts, to increase safety, and to improve both rail and highway operations. Each crossing has unique characteristics and intersection details that require further engineering analysis, examination of displacement impacts, and assessment of alternative solutions. However, the need for grade separation structures within the project area is evident, based upon the analyses presented in this Report.

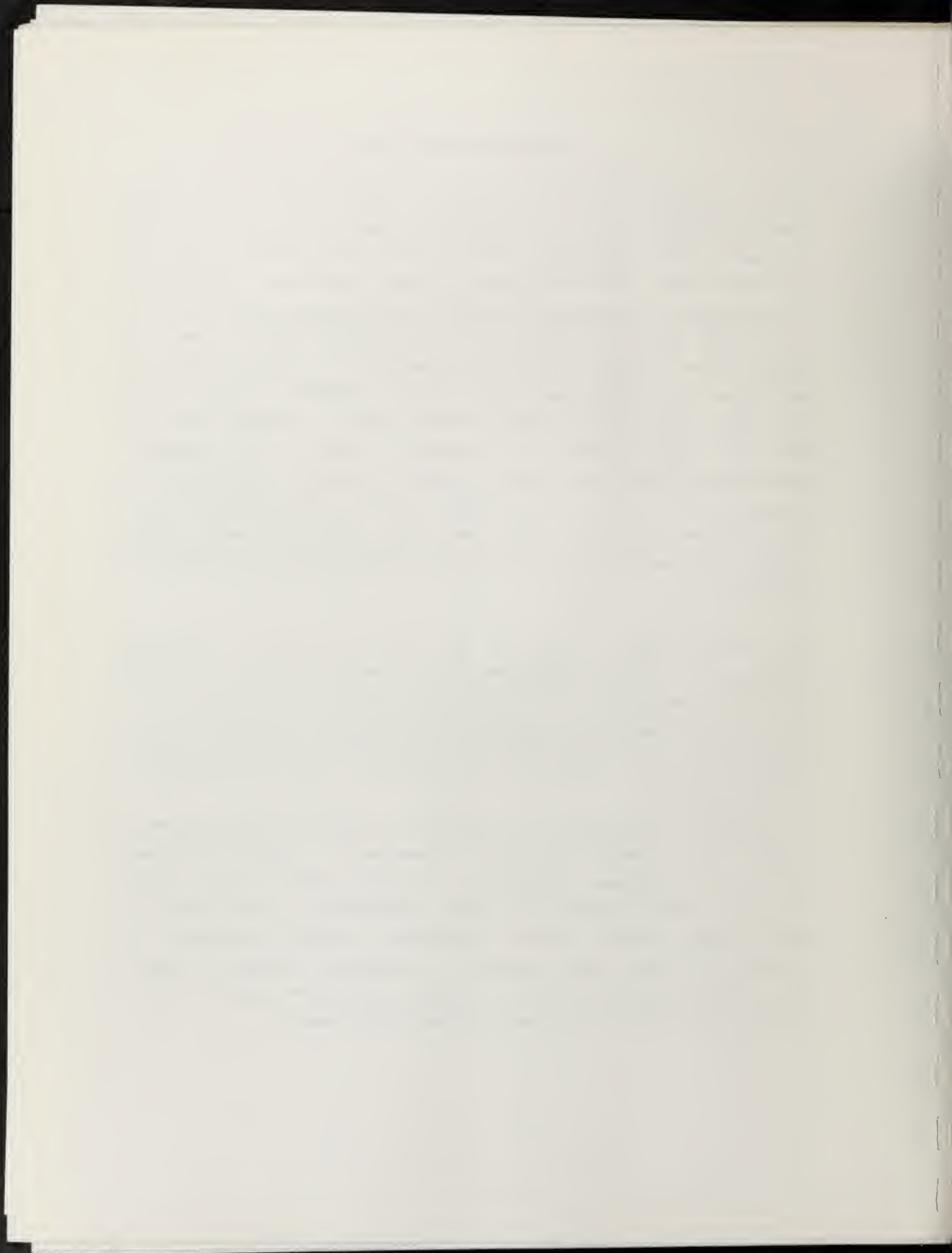


TABLE VI
GRADE SEPARATION ANALYSIS
SUMMARY OF ALTERNATIVES
RECOMMENDED ORDER OF INSTALLATION

STRUCTURE NUMBER	YEAR 2000 NO-BUILD	YEAR 2000 2 YARD	YEAR 2000 3 YARD DIRECTIONAL	YEAR 2000 3 YARD BI-DIRECTIONAL
1	w	x	x	x
3	w	5	5	6
4	x	3	3	3
5	w	x	x	x
18	w	2	2	2
19	x	x	x	4
24	x	4	4	5
43	w	7	7	8
44	w	8	8	9
45	w	9	9	10
46	w	1	1	1
47	w	10	10	11
52	x	6	6	7
TOTAL NUMBER OF STRUCTURES TO BE BUILT		10	10	11

w - Grade separation warranted but not ranked under No-Build alternative.

x - Grade separation not warranted.

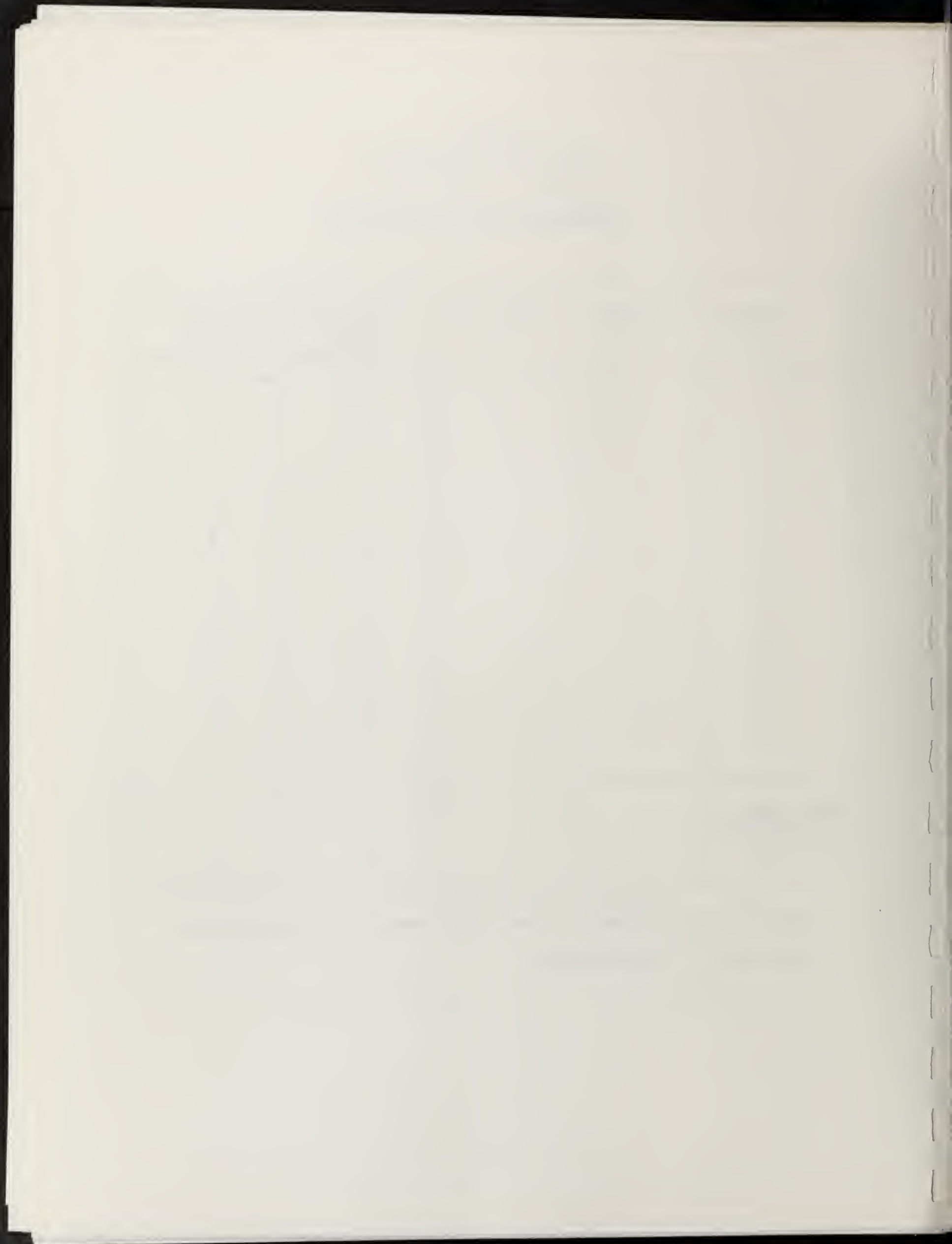


EXHIBIT B

GRADE SEPARATIONS

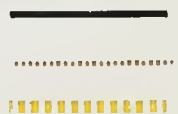
2000 NO BUILD



VICINITY MAP

LEGEND

RAILROAD TRACKS
CITY STREETS
INTERSTATE



GRADE SEPARATION
STRUCTURE NO.



6000 3000 0 5700

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

2000 NO BUILD



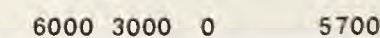
VICINITY MAP

LEGEND

RAILROAD TRACKS
CITY STREETS
INTERSTATE

GRADE SEPARATION
STRUCTURE NO.

00



SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT



EXHIBIT C

GRADE SEPARATIONS

2000 TWO YARD &
THREE YARD DIRECTIONAL



VICINITY MAP

LEGEND

RAILROAD TRACKS
CITY STREETS
INTERSTATE

GRADE SEPARATION
STRUCTURE NO.



6000 3000 0 5700

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

EXHIBIT C
GRADE SEPARATIONS
2000 TWO YARD &
THREE YARD DIRECTIONAL



VICINITY MAP

LEGEND

RAILROAD TRACKS	—
CITY STREETS	—
INTERSTATE	—
GRADE SEPARATION STRUCTURE NO.	00

6000 3000 0 5700

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT



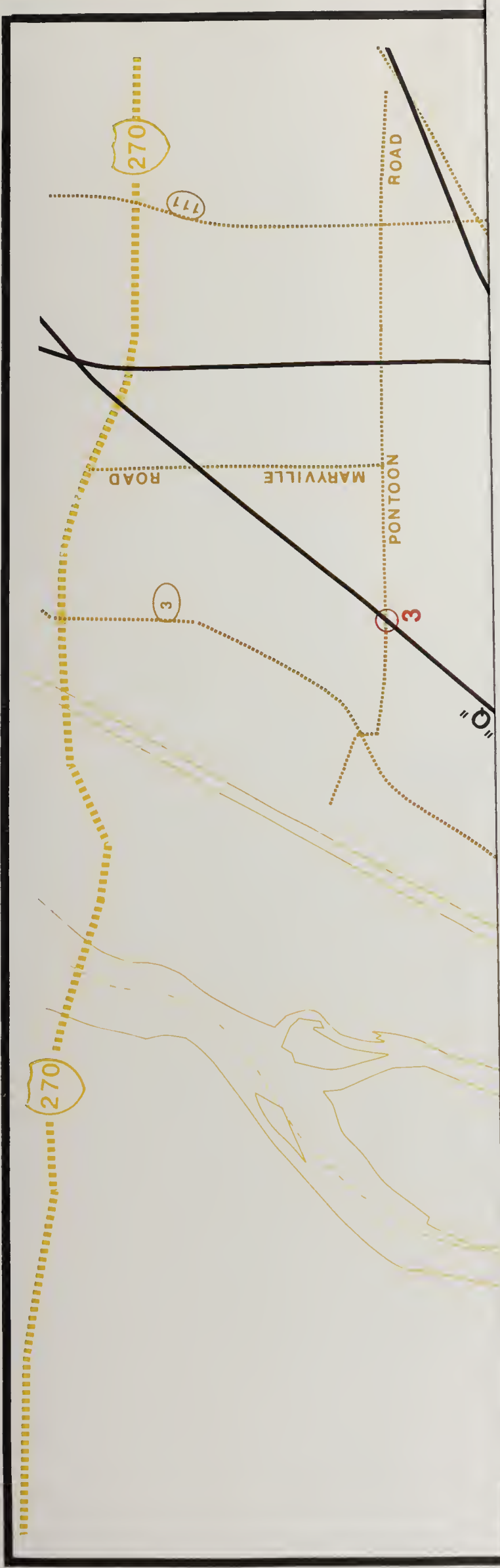


EXHIBIT D

GRADE SEPARATIONS

2000 THREE YARD
BI-DIRECTIONAL



VICINITY MAP

LEGEND

RAILROAD TRACKS	—————
CITY STREETS
INTERSTATE	—————
GRADE SEPARATION STRUCTURE NO.	○ 00

6000 3000 0 5700



SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

EXHIBIT D
GRADE SEPARATIONS
2000 THREE YARD
BI-DIRECTIONAL



VICINITY MAP

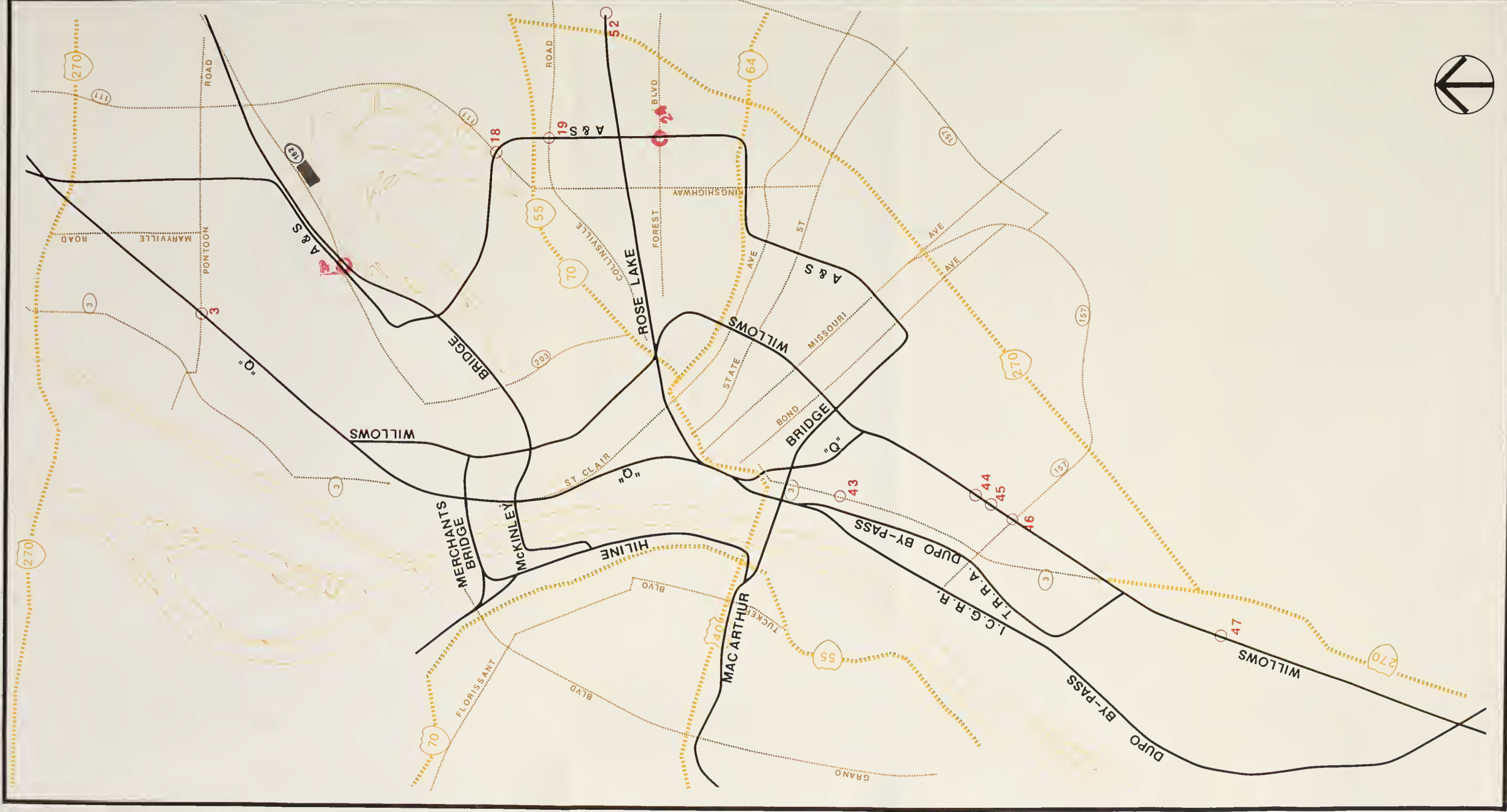
LEGEND

RAILROAD TRACKS	—
CITY STREETS	—
INTERSTATE	—
GRADE SEPARATION	○
STRUCTURE NO.	00

6000 3000 0 5700

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT



Appendix I

ST. LOUIS MARGE
GRADE SEPARATION
CROSSING IDENTIFICATION ANALYSIS

<u>Number</u>	<u>Highway Name</u>	<u>City</u>
1	Maryville Road	Granite City
2	Pontoon Road	Granite City
3	Pontoon Road	Granite City
4	S. R. 162	Granite City
5	25th Street	Granite City
6	22nd Street	Granite City
7	20th Street	Granite City
+ 8	19th Street	Granite City
9	Niedringhouse	Granite City
10	Market Street	Venice
11	Bend	Brooklyn
12	Bend	Brooklyn
13	S. R. #3-Adams	Brooklyn
14	Industrial Road	National City
15	Industrial Road	National City
16	S. R. 3	Brooklyn
17	S. R. 3	Brooklyn
18	S. R. 111	Fairmont City
19	Collinsville Road	Fairmont City
20	St. Clair	East St. Louis
21	Exchange	East St. Louis
22	Ninth	East St. Louis
+23	15th at Lincoln	East St. Louis
24	Forrest Boulevard	Washington Park
25	15th	East St. Louis
26	21st at Lynch	East St. Louis
27	St. Clair	East St. Louis
28	21st at St. Clair	East St. Louis

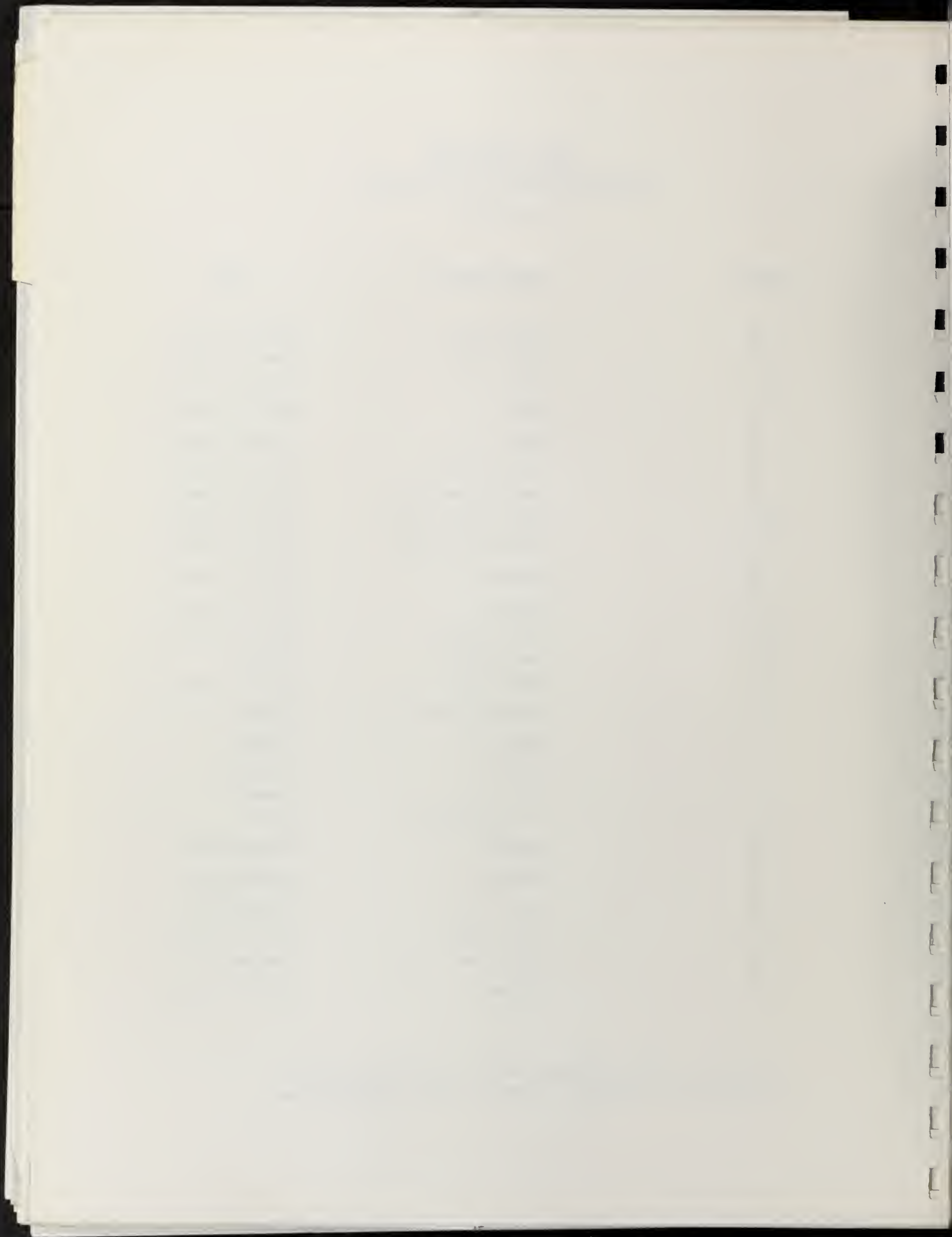


FIGURE A

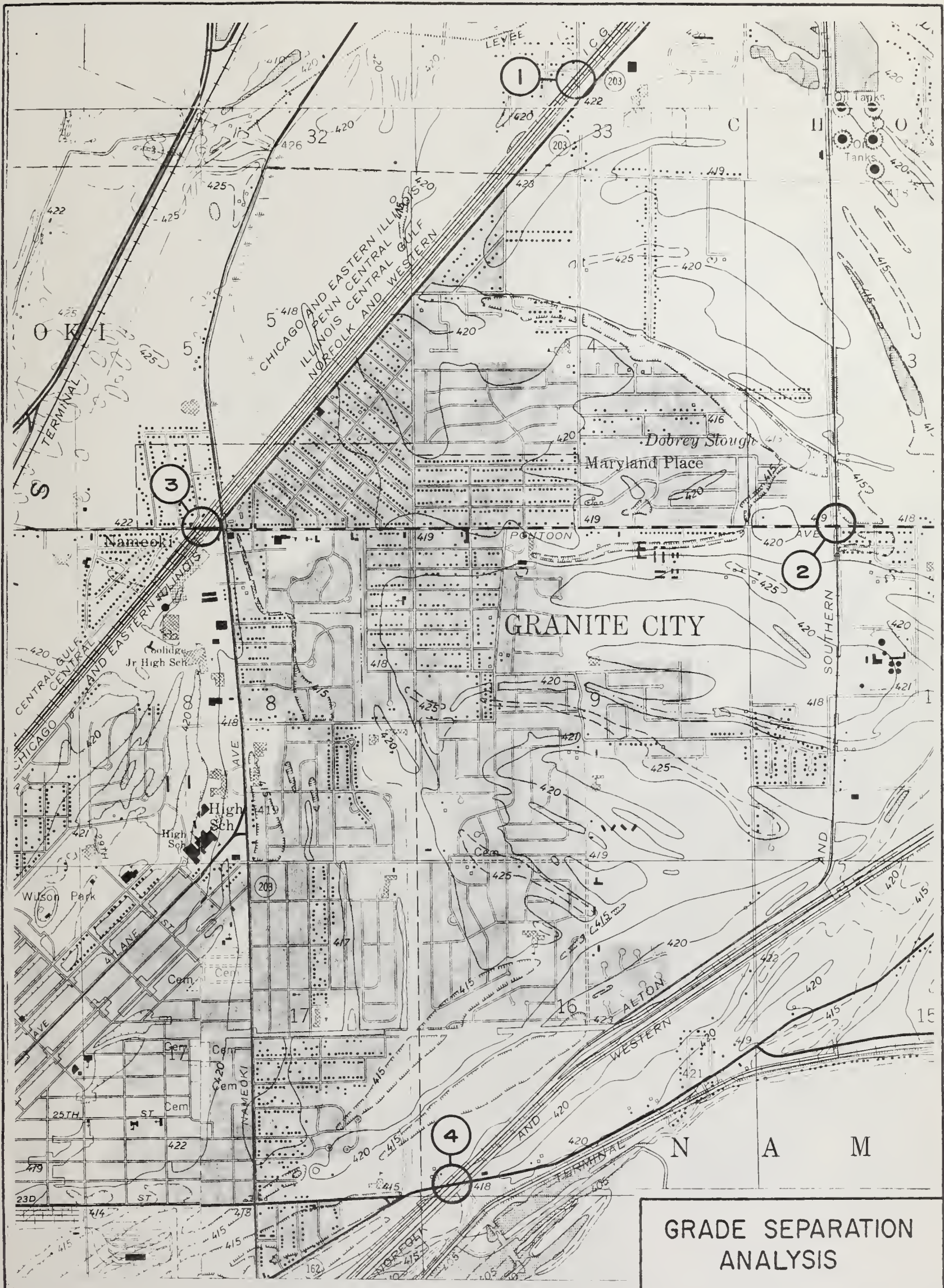


FIGURE B

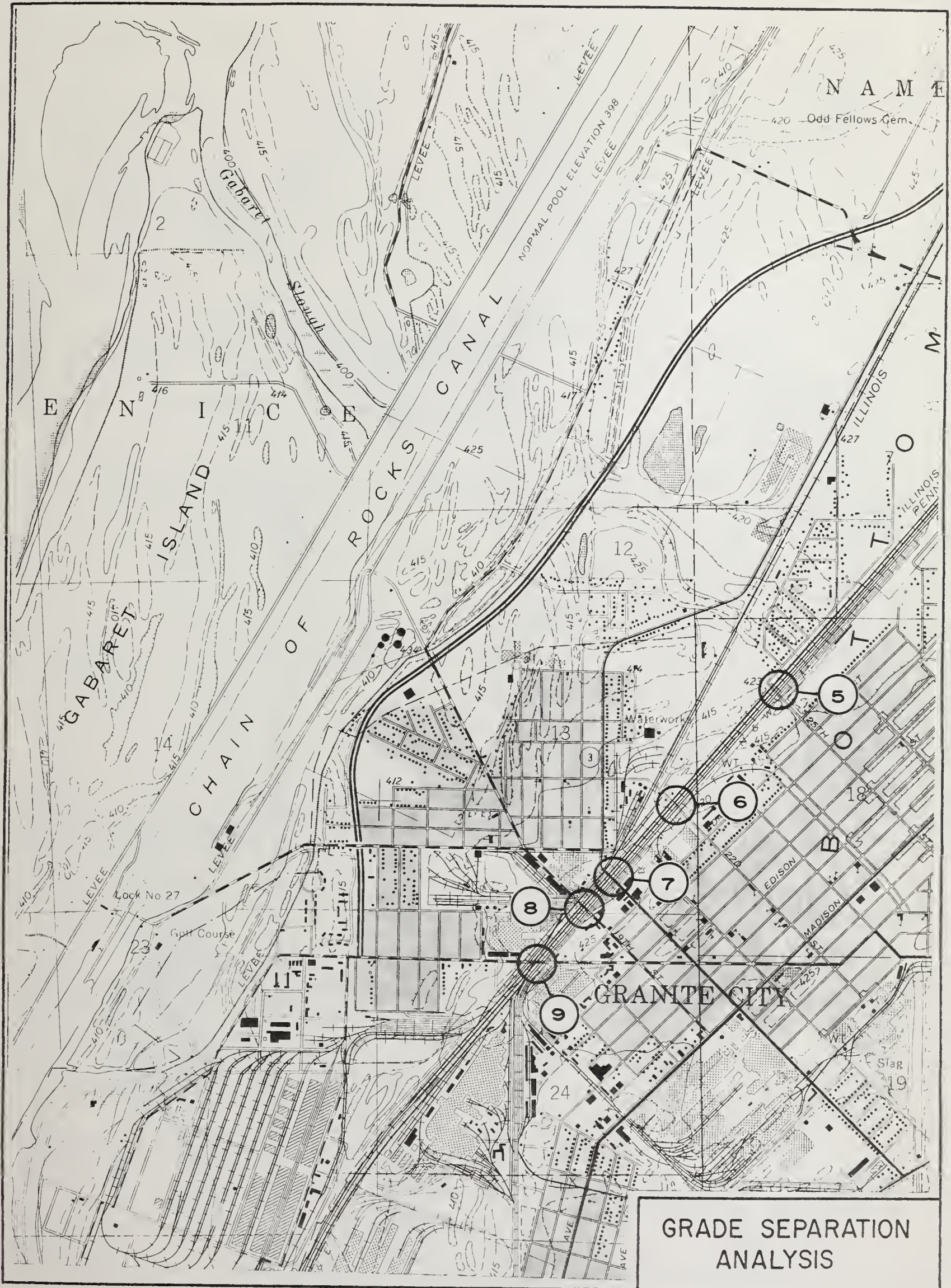


FIGURE C

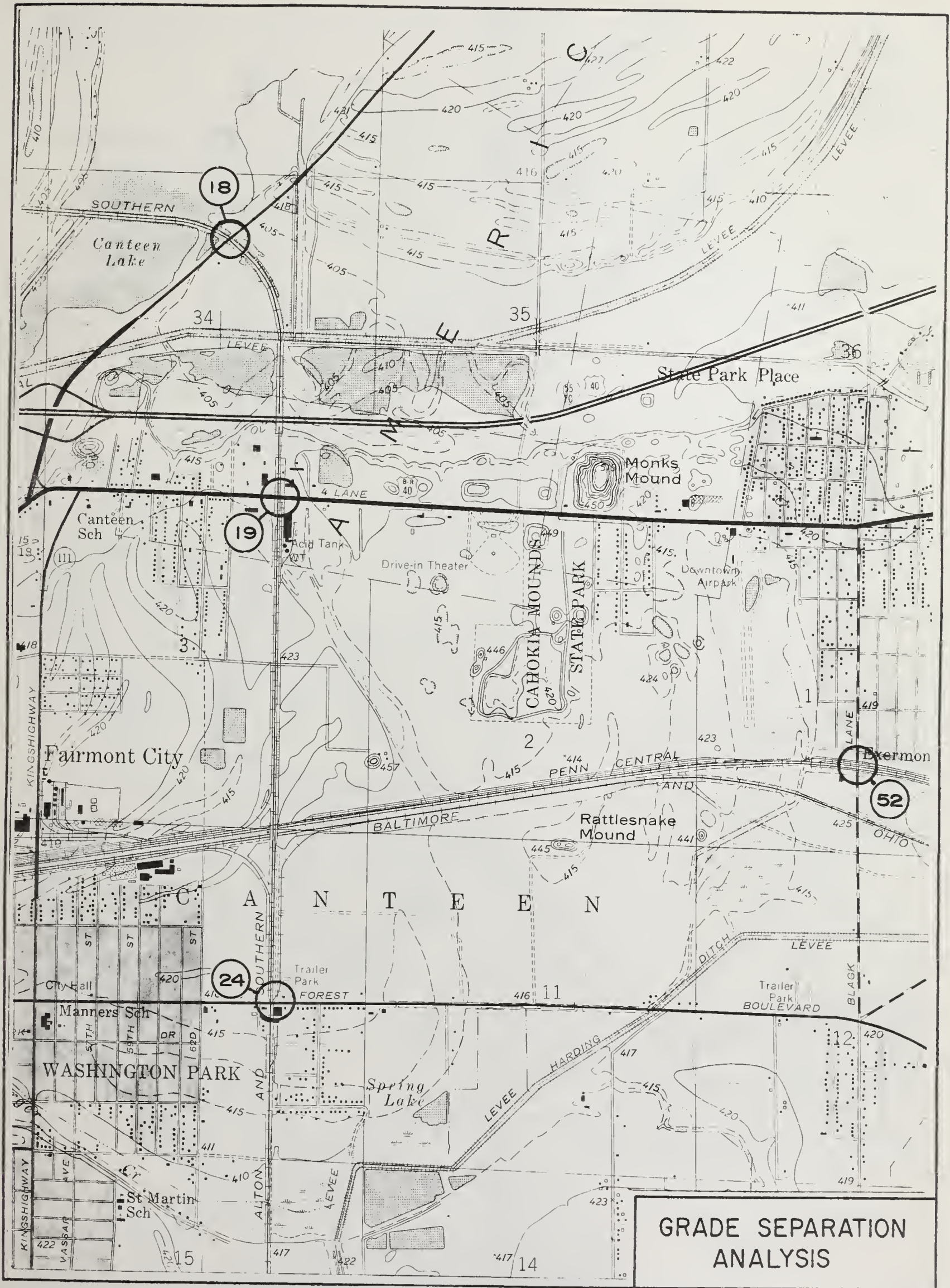


FIGURE D

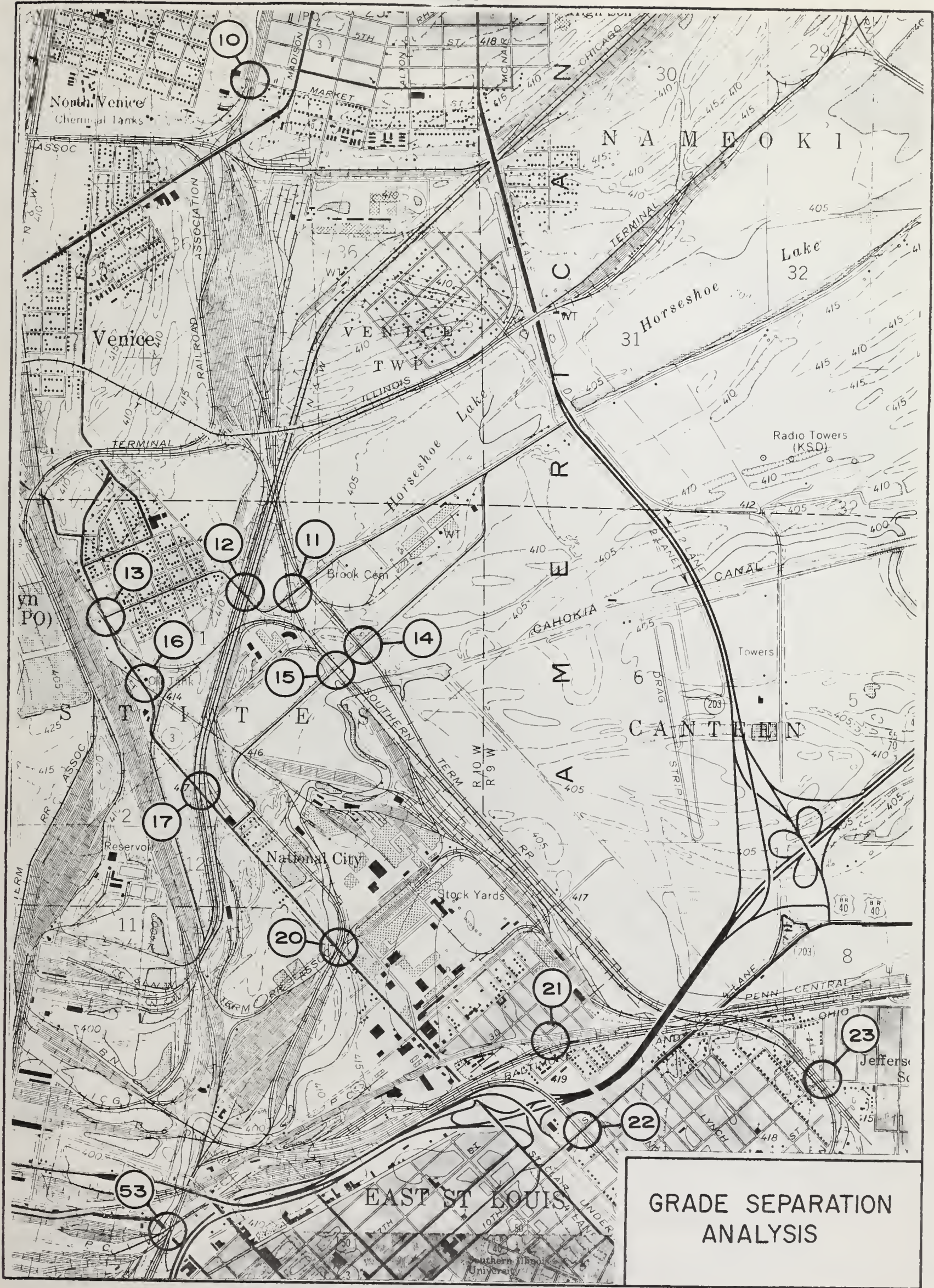
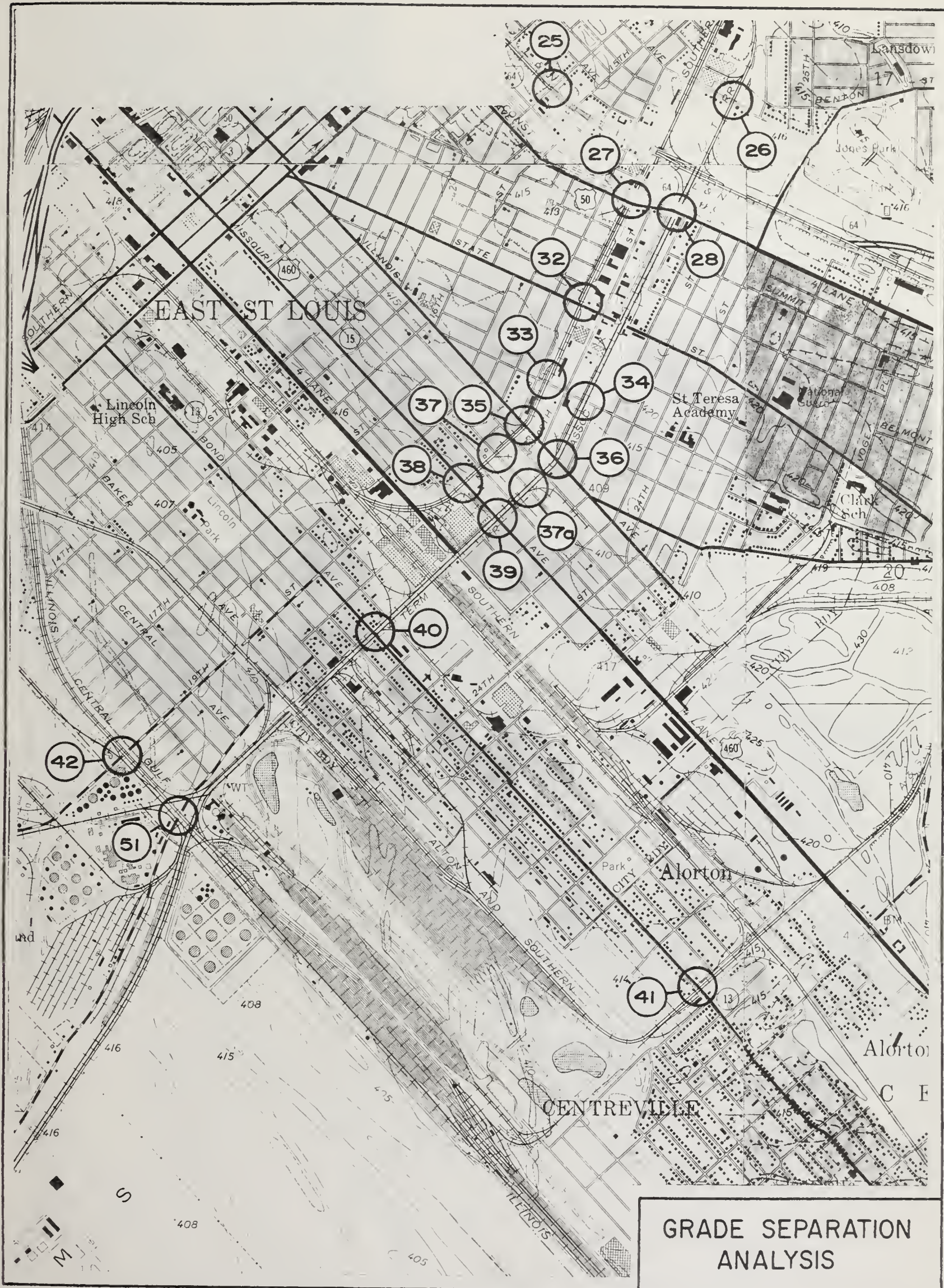


FIGURE E



Appendix II



FIGURE G

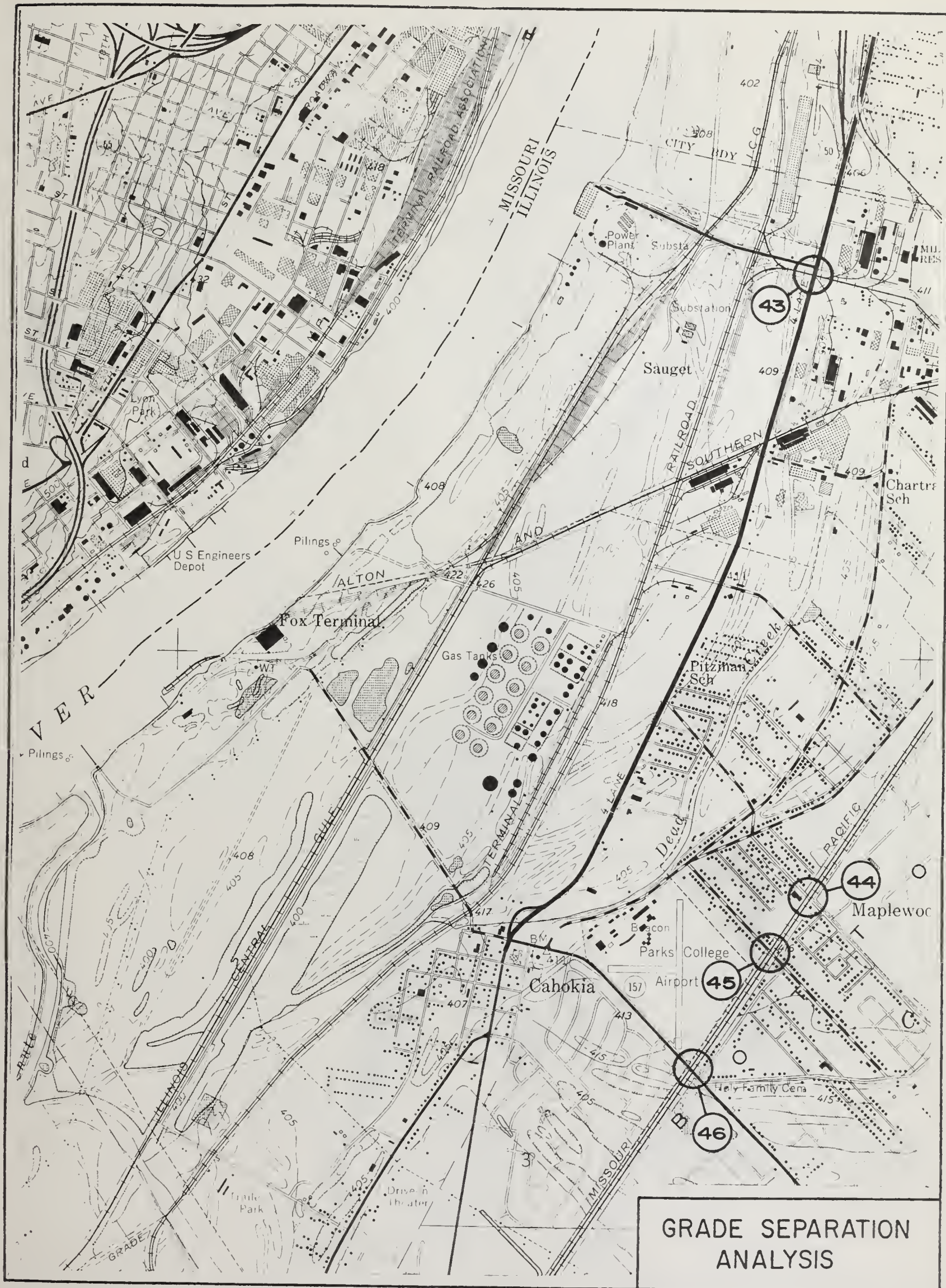


FIGURE H

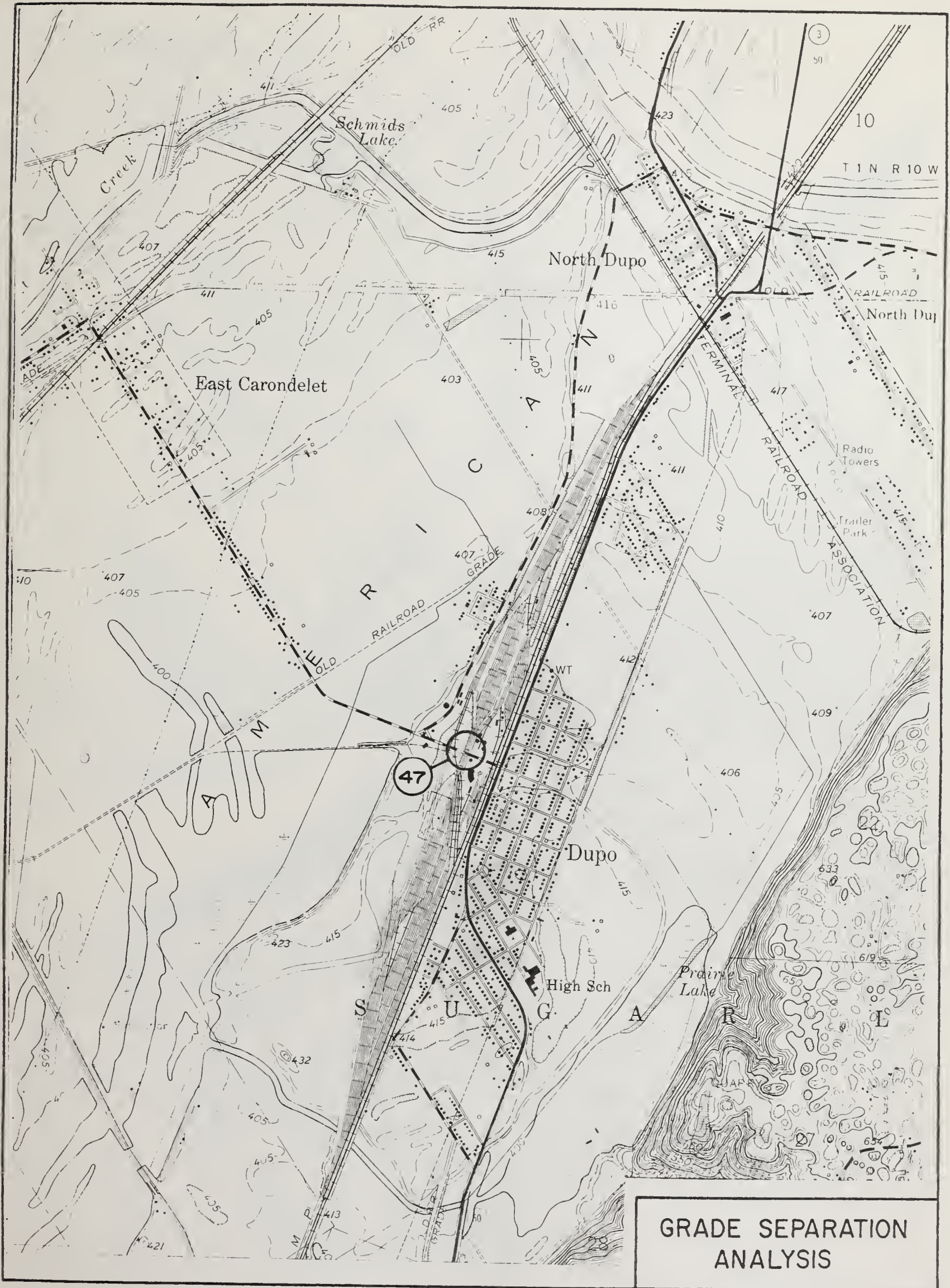
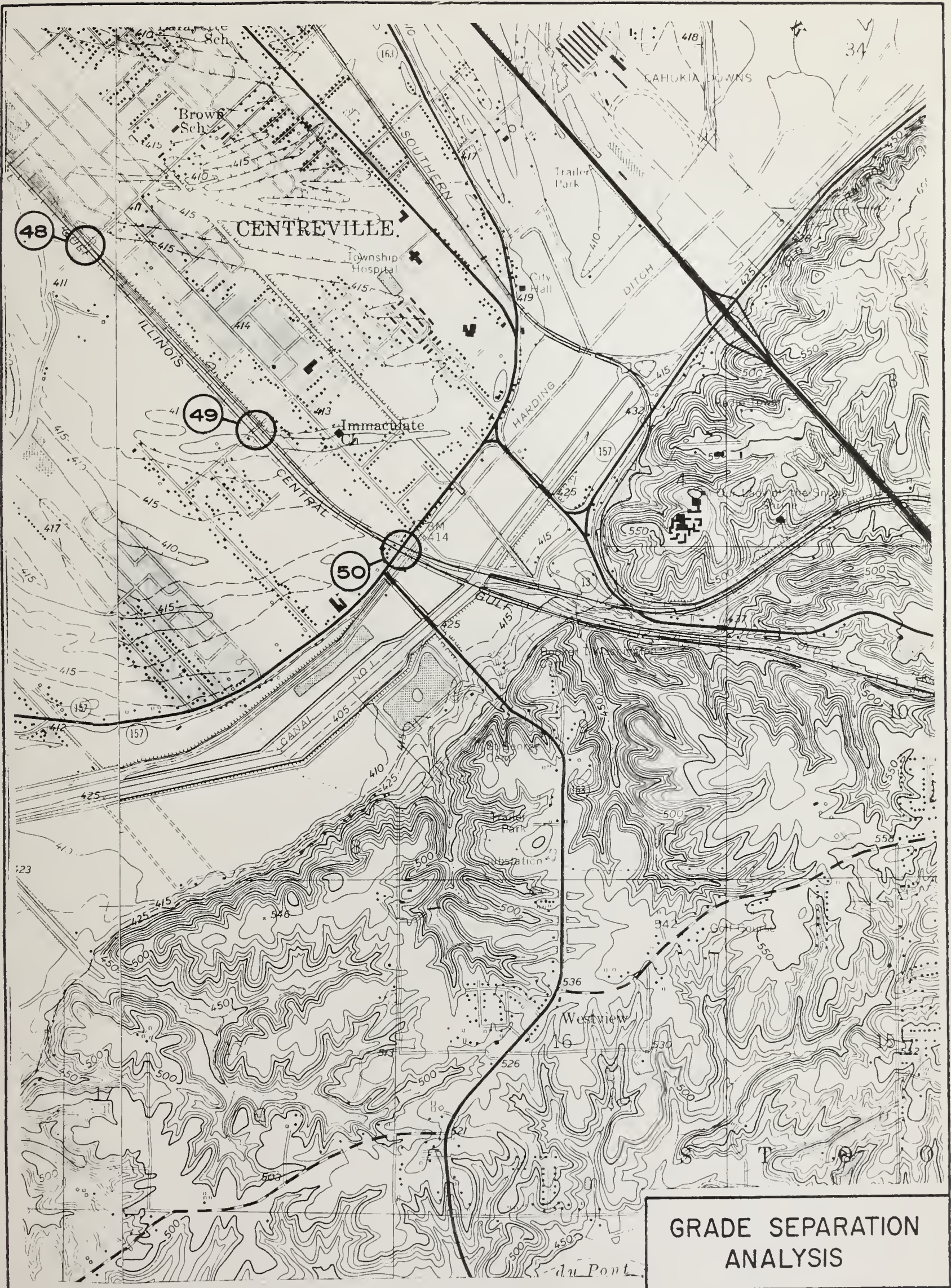


FIGURE I



Appendix II

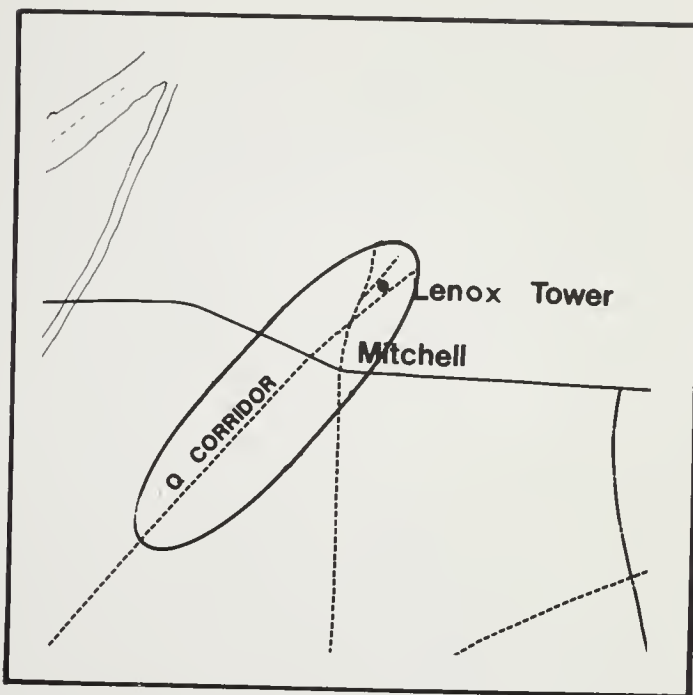
The figures in this Appendix were selected from a larger group of figures illustrating the corridor improvements throughout the study area and are included here to show in greater detail the location where grade separations are warranted under projected rail and highway volumes. Figures included are:

"Q" Corridor	Figure 4 of 4
A&S Corridor	Figure 2 of 5 3 of 5 4 of 5
Willows Corridor	Figure 4 of 6 5 of 6
Route 3 at Monsanto	Figure 1 of 1
Black Lane at Rose Lake Corridor	Figure 1 of 1

Other figures in the series may be found in Volume 2 of the Environmental Impact Statement.

FIGURE 4 OF 4

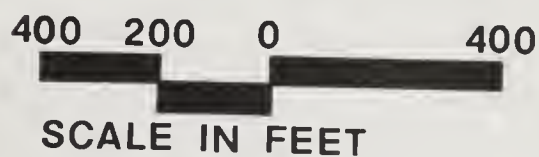
Q CORRIDOR



VICINITY MAP

LEGEND

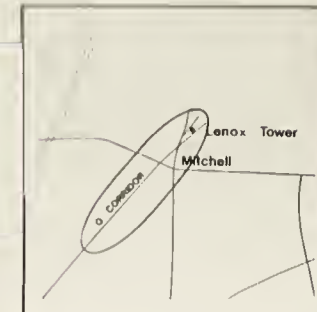
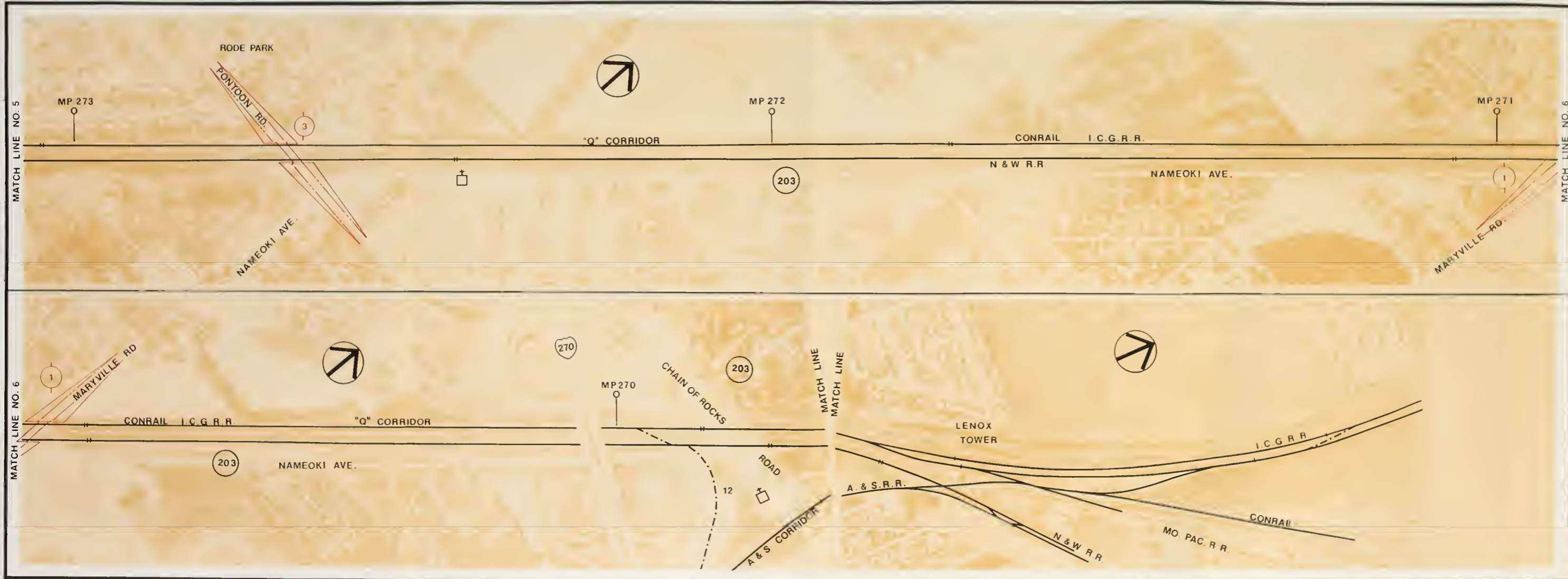
EXISTING RAIL	————
PROPOSED RAIL	- - - - -
NUMBER OF TRACKS (Designated by Vertical Lines)	
MILEPOST	— —○
SCHOOL	□
CHURCH	+
GRADE SEPARATION STRUCTURE NO.	○ 00



ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT



FIGURE 4 OF 4
Q CORRIDOR



VICINITY MAP

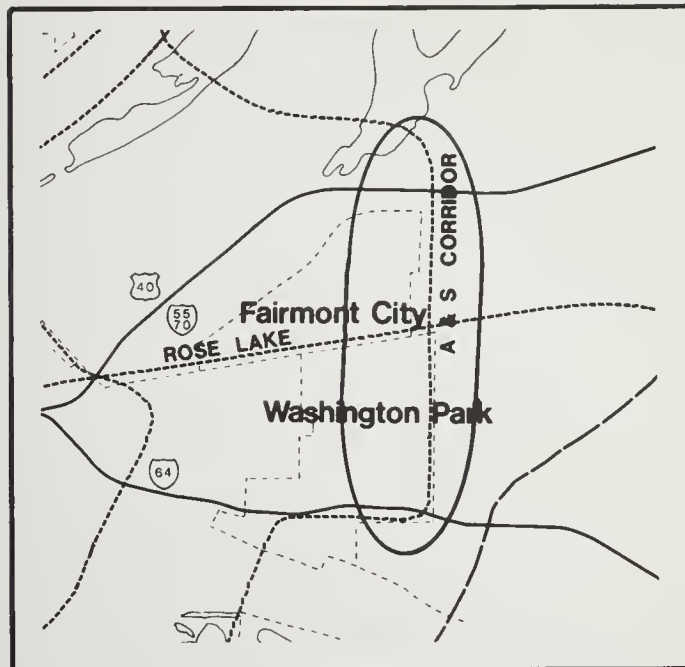
LEGEND

EXISTING RAIL	—
PROPOSED RAIL	- - - -
NUMBER OF TRACKS (Designated by Vertical Lines)	
MILEPOST	○
SCHOOL	⊕
CHURCH	⊞
GRADE SEPARATION STRUCTURE NO.	⊞

400 200 0 400
SCALE IN FEET

FIGURE 2 OF 5

A & S CORRIDOR



VICINITY MAP

LEGEND

EXISTING RAIL	————
PROPOSED RAIL	- - - - -
NUMBER OF TRACKS (Designated by Vertical Lines)	—+—
MILEPOST	—○—
SCHOOL	□
CHURCH	□
GRADE SEPARATION STRUCTURE NO.	○ 00

400 200 0 400



SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

MATCH LINE NO. 2

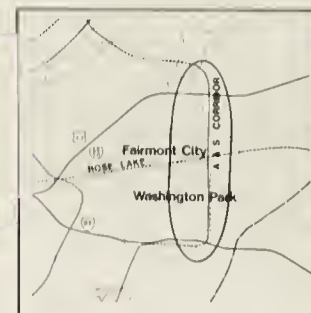
MATCH LINE NO. 3

LINE NO. 4

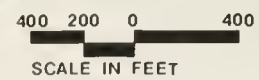
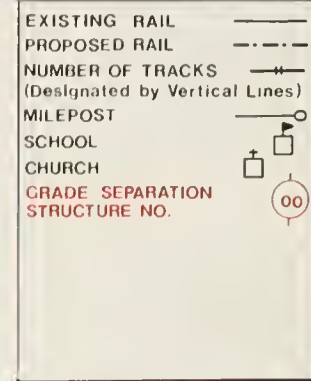
S CORRIDOR



FIGURE 2 OF 5
A & S
CORRIDOR



VICINITY MAP
LEGEND



A & S CORRIDOR



EXISTING RAIL	
PROPOSED RAIL	
NUMBER OF TRACKS (Designated by Vertical Lines)	
MILEPOST	
SCHOOL	
CHURCH	
RAIL TO BE RETIRED	
GRADE SEPARATION STRUCTURE NO.	



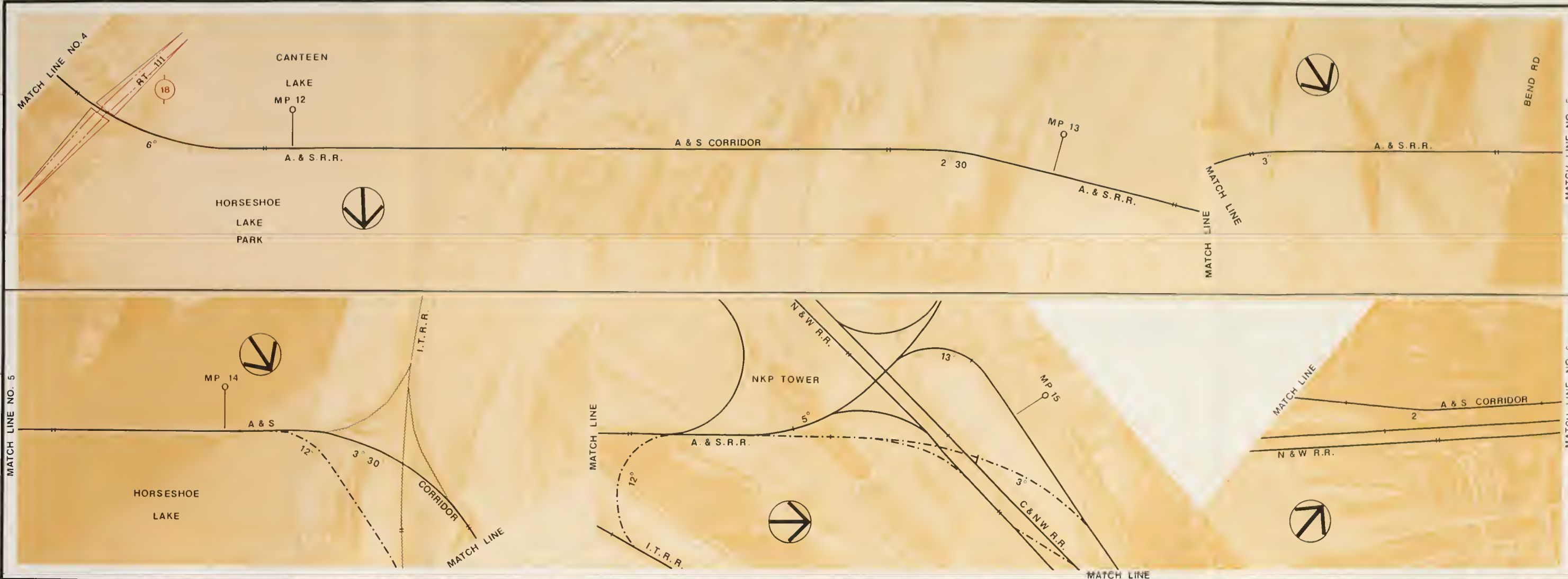


FIGURE 3 OF 5

A & S CORRIDOR



VICINITY MAP

LEGEND

EXISTING RAIL	—
PROPOSED RAIL	- - -
NUMBER OF TRACKS (Designated by Vertical Lines)	
MILEPOST	○
SCHOOL	□
CHURCH	⊕
RAIL TO BE RETIRED	~
GRADE SEPARATION	~
STRUCTURE NO.	00

400 200 0 400

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

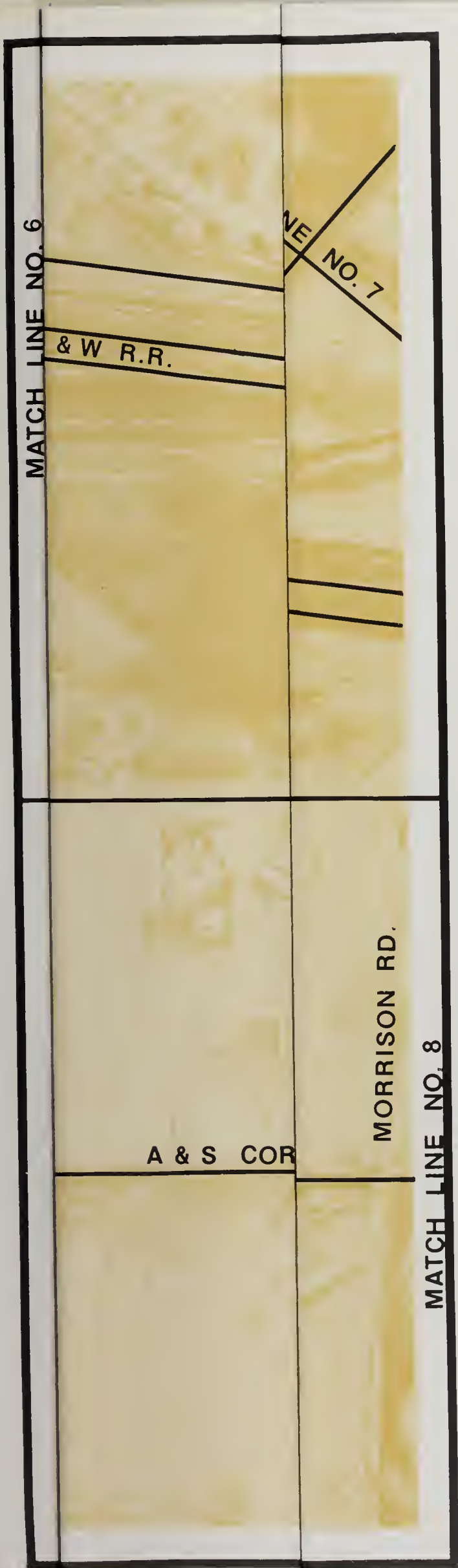
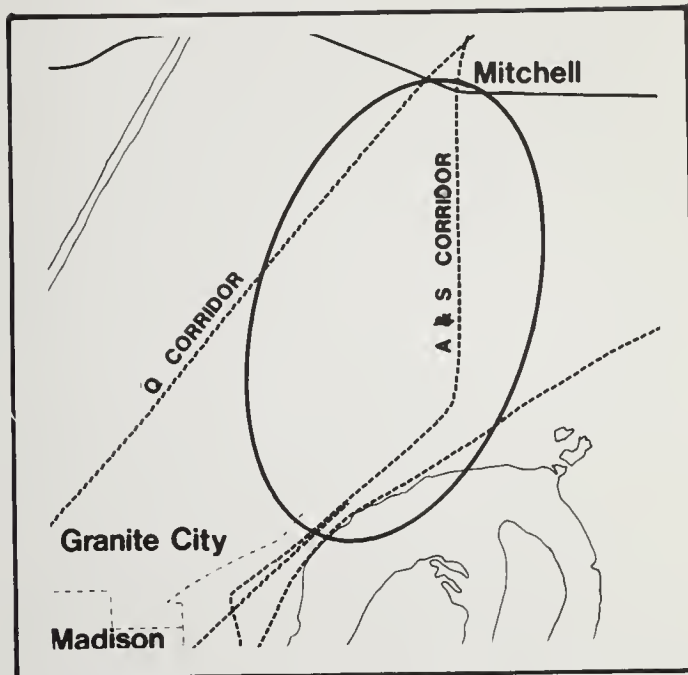


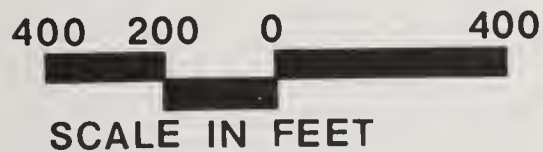
FIGURE 4 OF 5

A & S CORRIDOR



VICINITY MAP LEGEND

EXISTING RAIL	————
PROPOSED RAIL	- - - - -
NUMBER OF TRACKS (Designated by Vertical Lines)	—+—
MILEPOST	—○—
SCHOOL	□
CHURCH	⊕
GRADE SEPARATION STRUCTURE NO.	⊙ 00



ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

EDWARDSVILLE RD.

MP 16

A & S CORRIDOR

2°

N & W R.R.

C & N W R.R.

MP 17

I.T.R.R.

162



MP 18

PONTOON RD.



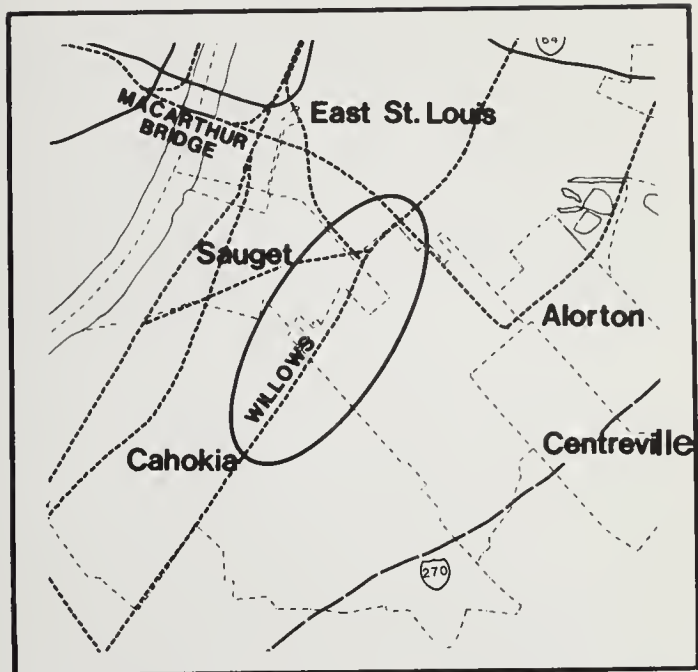
A & S CORRIDOR

MP 19

MATCH LINE NO. 7

FIGURE 4 OF 6

WILLOWS CORRIDOR



VICINITY MAP

LEGEND

EXISTING RAIL	————
PROPOSED RAIL	- - - - -
NUMBER OF TRACKS (Designated by Vertical Lines)	—+—
MILEPOST	— —○
SCHOOL	□
CHURCH	□
GRADE SEPARATION STRUCTURE NO.	00

400 200 0 400
SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

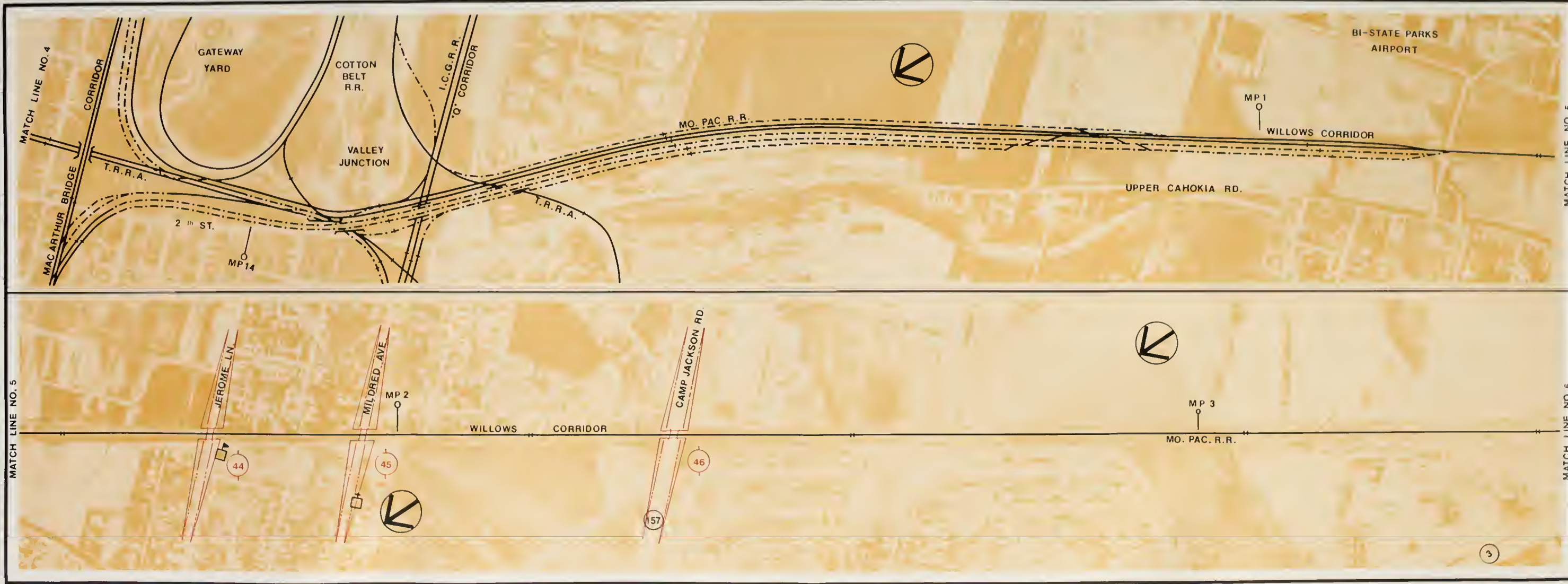
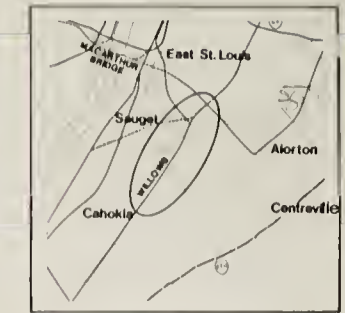


FIGURE 4 OF 6

WILLOWS CORRIDOR



VICINITY MAP

LEGEND

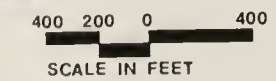
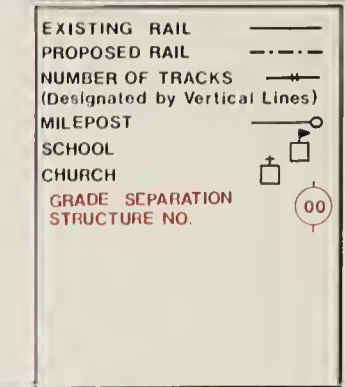
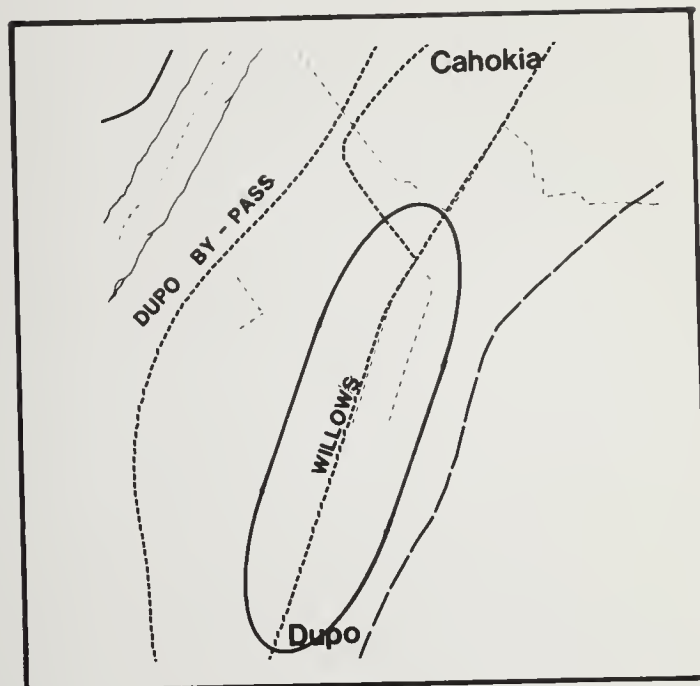


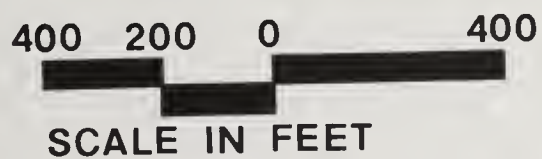
FIGURE 5 OF 6
**WILLOWS
 CORRIDOR**



VICINITY MAP

LEGEND

EXISTING RAIL	————
PROPOSED RAIL	- - - - -
NUMBER OF TRACKS (Designated by Vertical Lines)	——#——
MILEPOST	—— ——○
SCHOOL	□
CHURCH	□+
GRADE SEPARATION STRUCTURE NO.	○00○



ST. LOUIS MARGE PROJECT
 SVERDRUP/ENVIRODYNE/KNIGHT

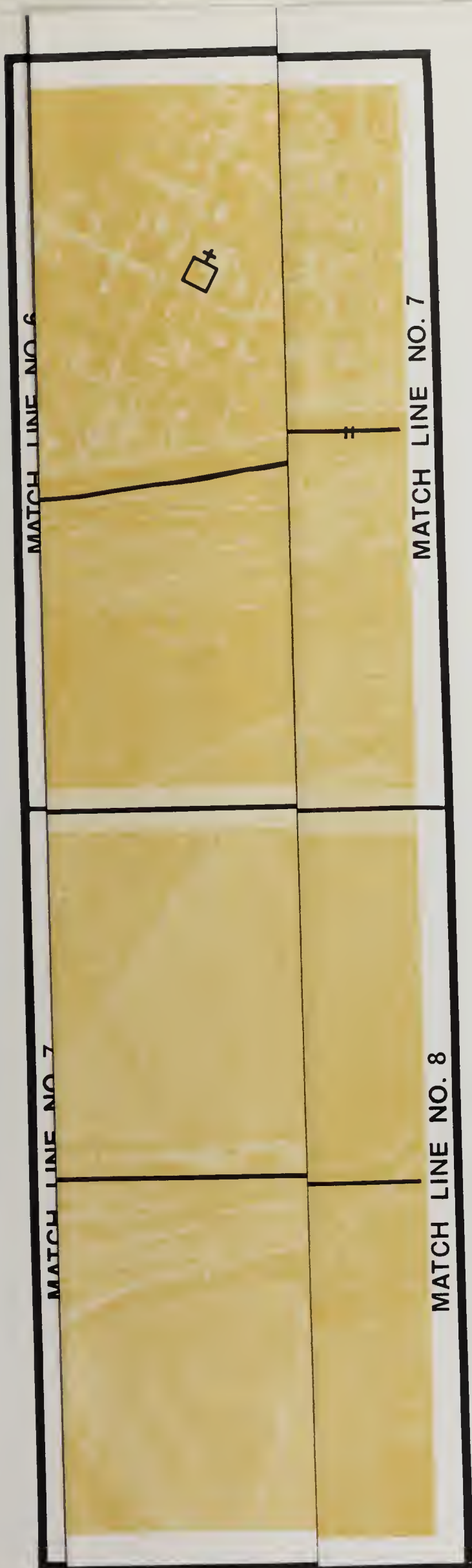
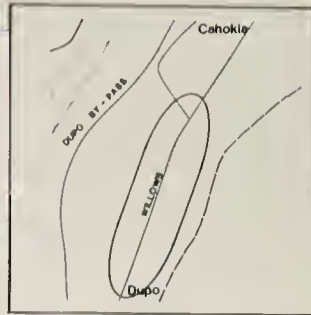


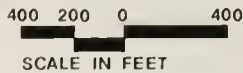
FIGURE 5 OF 6
WILLOWS CORRIDOR



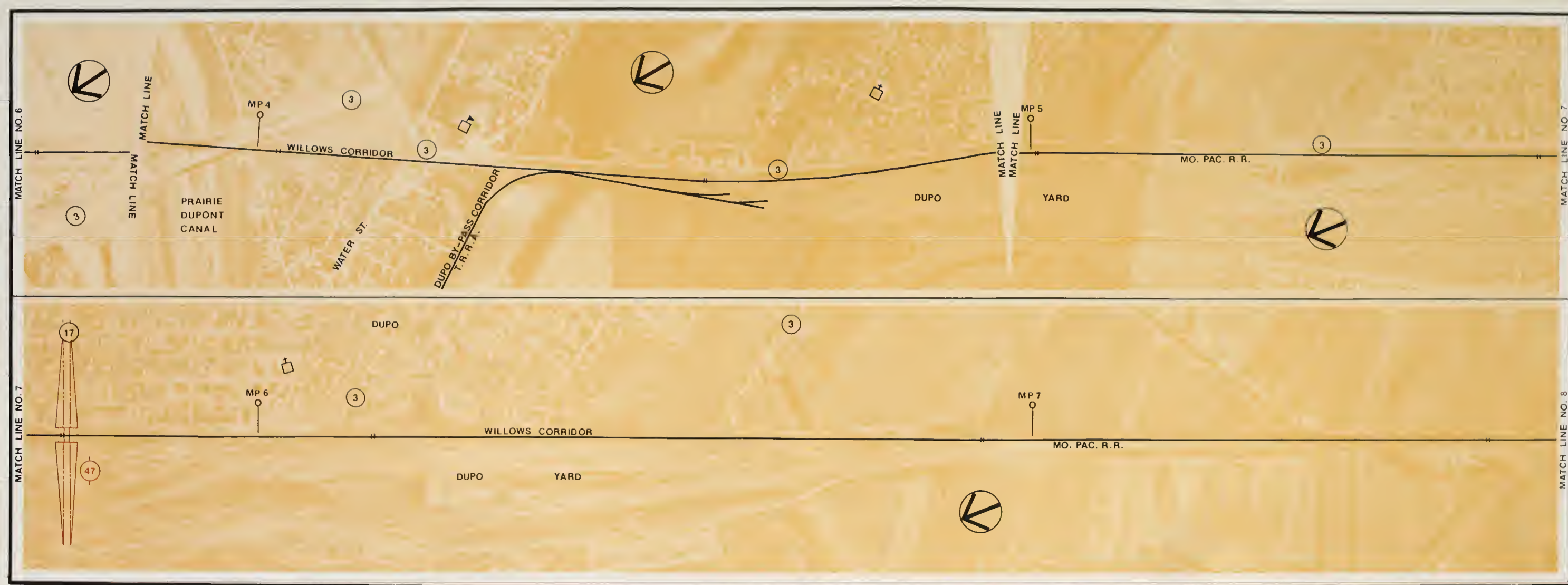
VICINITY MAP

LEGEND

EXISTING RAIL	————
PROPOSED RAIL	- - - - -
NUMBER OF TRACKS (Designated by Vertical Lines)	
MILEPOST	○
SCHOOL	□
CHURCH	⊕
GRADE SEPARATION STRUCTURE NO	00

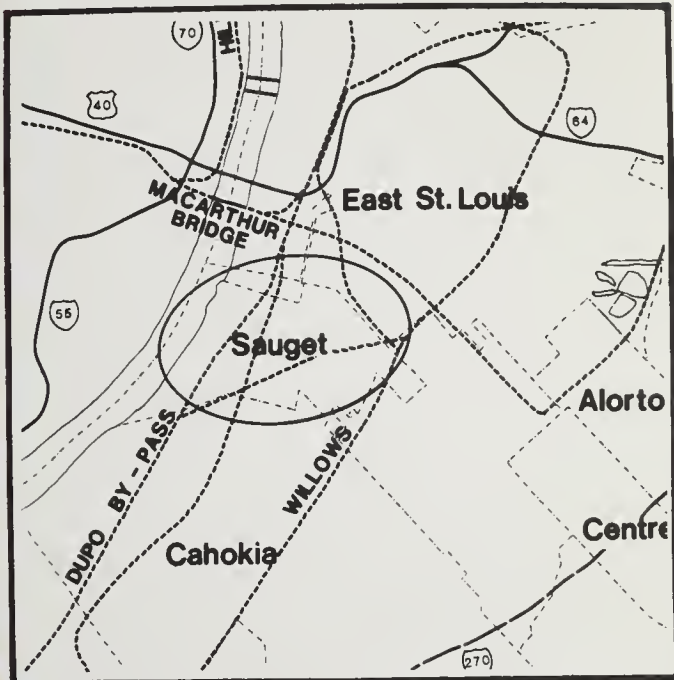


ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT



MISSISS

FIGURE 1 OF 1 ROUTE 3 AT MONSANTO



VICINITY MAP

LEGEND

EXISTING RAIL ———
NUMBER OF TRACKS ———+———
(Designated by Vertical Lines)
GRADE SEPARATION (OO)
STRUCTURE NO.

400 200 0 400



SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT



FIGURE 1 OF 1
ROUTE 3
AT MONSANTO



VICINITY MAP

LEGEND

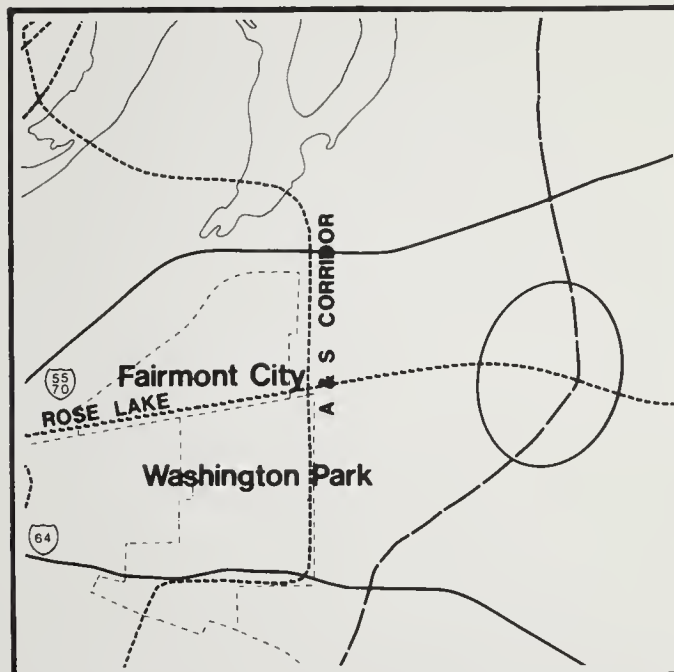
EXISTING RAIL	—
NUMBER OF TRACKS (Designated by Vertical Lines)	—+—
GRADE SEPARATION STRUCTURE NO.	(00)

400 200 0 400

SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE/KNIGHT

FIGURE 1 OF 1 BLACK LANE AT ROSE LAKE CORRIDOR



VICINITY MAP

LEGEND

EXISTING RAIL	—
NUMBER OF TRACKS (Designated by Vertical Lines)	—+—
GRADE SEPARATION STRUCTURE NO.	(00)

400 200 0 400
SCALE IN FEET

ST. LOUIS MARGE PROJECT
SVERDRUP/ENVIRODYNE / KNIGHT

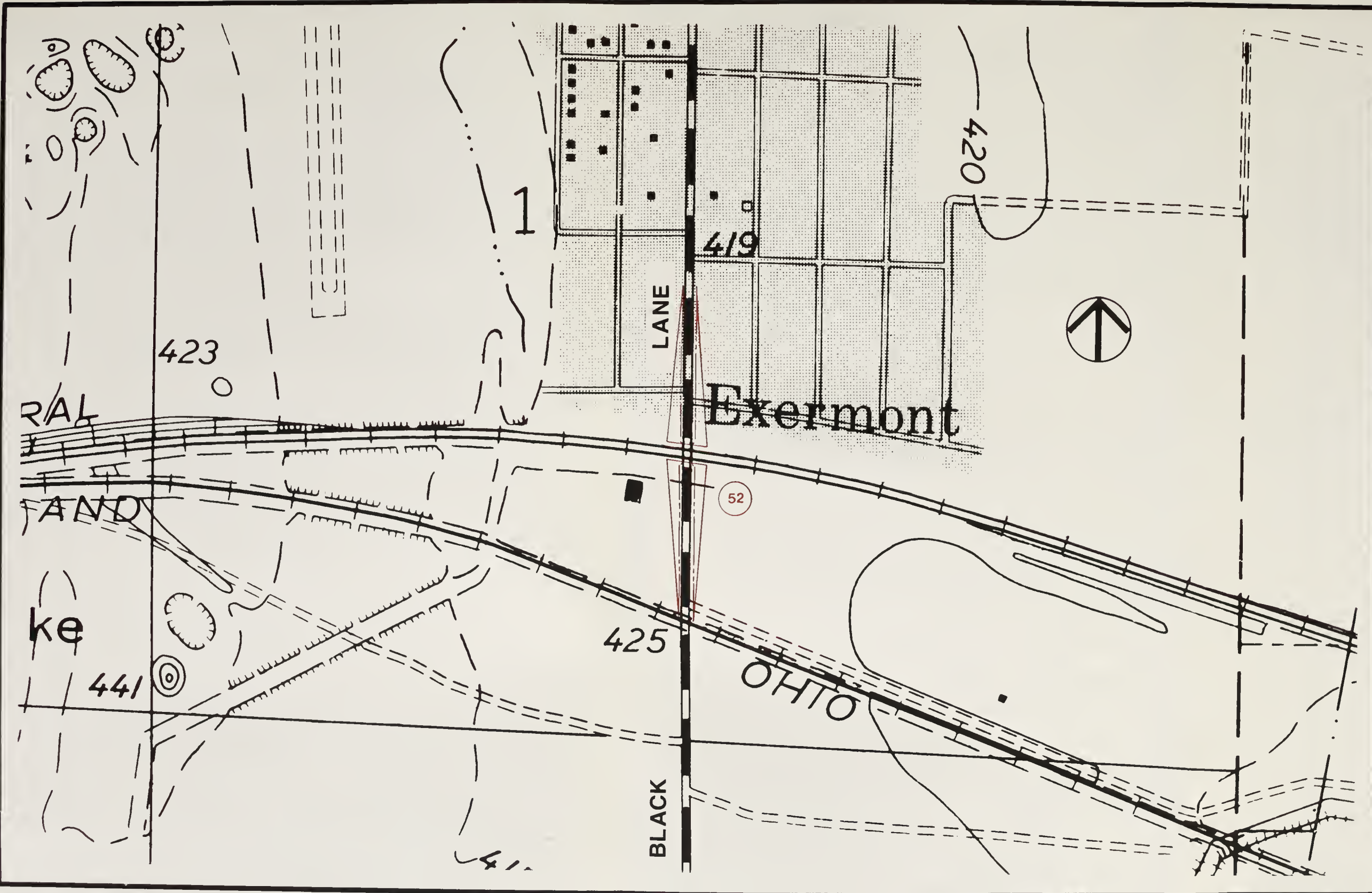
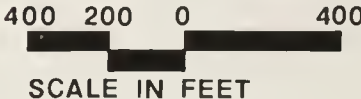
FIGURE 1 OF 1
BLACK LANE AT
ROSE LAKE CORRIDOR



VICINITY MAP

LEGEND

- EXISTING RAIL
- NUMBER OF TRACKS (Designated by Vertical Lines)
- GRADE SEPARATION STRUCTURE NO.





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